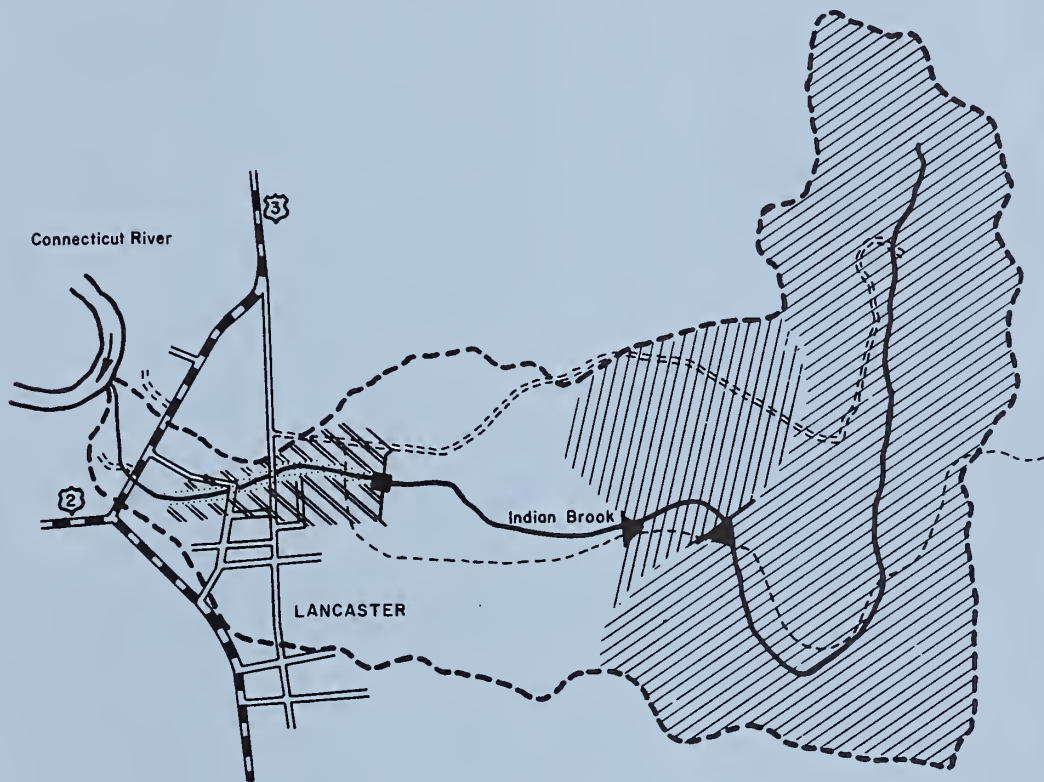


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# FINAL ENVIRONMENTAL STATEMENT



## INDIAN BROOK WATERSHED

Lancaster, Coos County, New Hampshire

Prepared by:

U. S. Department of Agriculture

Soil Conservation Service

September 1975

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INDIAN BROOK WATERSHED PROJECT  
Coos County, New Hampshire

FINAL ENVIRONMENTAL STATEMENT

Donald G. Burbank  
State Conservationist  
Soil Conservation Service

Sponsoring Local Organizations

Town of Lancaster, Town Hall, Lancaster, New Hampshire 03584

Coos County Conservation District, 99 Main Street  
Lancaster, New Hampshire 03584

New Hampshire Fish and Game Department  
State of New Hampshire  
34 Bridge Street  
Concord, New Hampshire 03301

New Hampshire Water Resources Board  
State of New Hampshire  
37 Pleasant Street  
Concord, New Hampshire 03301

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Soil Conservation Service  
Durham, New Hampshire 03824



## USDA ENVIRONMENTAL STATEMENT

Indian Brook Watershed Project  
Coos County  
New HampshirePrepared in Accordance with  
Sec. 102(2)(c) of PL 91-190SUMMARY

- I FINAL
- II Soil Conservation Service
- III Administrative
- IV Description of Project Purpose and Action

A watershed protection, flood prevention, and fish and wildlife development project in the Indian Brook Watershed, located in Coos County, New Hampshire, will be installed by local sponsoring organizations with federal assistance under Public Law 83-566, as amended. The watershed drainage area is 1,420 acres.

The project includes the installation of land treatment measures on 1,295 acres to reduce runoff, erosion and sedimentation. It also includes one floodwater retarding structure, one multiple-purpose dam for flood protection and fish and wildlife habitat development, fish and wildlife facilities, and about 3,000 feet of channel work.

- V Summary of Environmental Impact and Adverse Environmental Effects

Hydrologic conditions in the watershed will be improved with a 5 percent reduction in peak runoff due to the installation of land treatment measures. Forest and crop productivity and wildlife habitat will be maintained and improved. The project will protect 30 acres in the urban area of Lancaster from storms up to and including the 100-year storm. Thirty residences, portions of four farms and 17 acres of forest and hay land in this area will benefit. This will increase the value and development potential of the land. A 140-acre development, including a 52-acre marsh and an 88-acre buffer area, will be provided for fish and wildlife maintenance, protection and propagation. Public access will be available to the development and 75 hunter days and 75 to 100 fisherman days will result annually. The construction area at each site will be seeded to grasses and legumes which will provide 17 acres for wildlife food and cover. Sediment will be trapped at each site, removing it from the stream and thus improving water quality.

About 3,600 feet of stream and 30 acres of fir-spruce forest will be flooded by the marsh at site 1. About 3,000 feet of stream in the flood plain will be modified, and fishlife and the related food chain will be disturbed.

About 177 acres of land will be committed to the project. Traffic will be disrupted as road culverts are replaced. Temporary effects during construction will result from noise, water and air pollution, and accelerated erosion. The maximum annual sediment yield during construction will increase to 0.88 ton per acre from the present yield of 0.11 ton per acre. The average concentration of sediment will increase from 50 ppm at present to 380 ppm during construction.

#### VI List of Alternatives Considered

1. Land treatment alone.
2. Land use controls and flood insurance.
3. Floodproofing.
4. Relocation of existing buildings.
5. Combination of relocation, floodproofing and land use controls.
6. Fish and wildlife development.
7. Channel work alone.
8. Floodwater retarding structures.
9. Channel work and a multiple-purpose structure.
10. No project.

#### VII Agencies from Which Comments Have Been Received

Department of Commerce, Department of Health, Education and Welfare, Department of the Interior, Department of Transportation, Advisory Council on Historic Preservation, Environmental Protection Agency, New Hampshire Department of Public Works and Highways, New Hampshire Department of Resources and Economic Development, New Hampshire Office of Comprehensive Planning (State Clearinghouse), New Hampshire Water Supply and Pollution Control Commission, North Country Council, Inc. (Regional Clearinghouse), Sierra Club.

#### VIII Draft statement transmitted to the Council on Environmental Quality on November 1, 1974.



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USDA SOIL CONSERVATION SERVICE

FINAL ENVIRONMENTAL STATEMENT

for

Indian Brook Watershed  
Coos County, New Hampshire

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of Public Law 83 566, 83d Congress, 68 Stat. 666, as amended.

SPONSORING LOCAL ORGANIZATIONS

The sponsoring local organizations for the project are the Coos County Conservation District, the Town of Lancaster, the New Hampshire Fish and Game Department, and the New Hampshire Water Resources Board.

PROJECT OBJECTIVES AND PURPOSES

The purpose of the project is to reduce flooding, peak runoff, erosion and sedimentation; protect and improve existing fish and wildlife resources; provide multiple-use of floodwater retarding sites; and aid in land use planning.



## PLANNED PROJECT<sup>1/</sup>

Indian Brook Watershed Project is located in the town of Lancaster, Coos County, in northern New Hampshire. It lies on the northwestern fringe of the White Mountain National Forest about 110 miles north of Concord, New Hampshire, and is within the Connecticut River Basin.

The watershed project consists of land treatment, a multiple-purpose dam for flood protection and fish and wildlife habitat development, a flood-water retarding structure, fish and wildlife facilities, and about 3,000 feet of channel work. (See project map, appendix B.) This planned project, discussed below, will become part of the Town of Lancaster flood management plan which includes flood plain use regulations and the Department of Housing and Urban Development flood insurance program.

### Land Treatment

The land treatment phase of the plan applies to each acre in the watershed. Landowners and operators will be encouraged to manage and operate their lands to maintain the adequate cover and treatment measures now on the ground. They will also be encouraged to install conservation measures to meet problems in the watershed. The landowners will install these measures dependent upon their individual interests, their means to do so, and applicable State and local laws.

The Coos County Conservation District and state and federal agencies will take such actions as needed to inform the public of technical and financial assistance available to assist them in necessary and proper land treatment.

Technical assistance will be provided to landowners to develop new conservation and woodland management plans and to revise existing plans as necessary. Technical assistance will also be available to landowners for the installation of conservation measures which are set forth in their plans. In addition, technical assistance will also be provided to the Town, regional planning agencies, developers and others in planning land use changes in a manner consistent with environmental quality. The Soil Conservation Service will develop detailed soil surveys as needed in all phases of planning.

Through consensus of the Conservation District, community leaders, landowners, and state and federal agencies, it was agreed that essential land treatment should be applied to 1,125 acres of forest land, 15 acres of hay and pasture land, 50 acres of land expected to undergo urban development, and 105 acres of miscellaneous land.

---

<sup>1/</sup> All information and data, except as otherwise noted by reference to source, were collected during watershed planning investigation by the Soil Conservation Service and Forest Service, U. S. Department of Agriculture.

Forest land treatment measures, to be installed on 1,125 acres, will be proper harvest cutting, skid trail and access road location and stabilization, recreation area improvement, recreation trails and walkways<sup>1/</sup>, wildlife habitat management<sup>2/</sup>, and fire protection.

Land treatment measures to be applied to the 15 acres of pasture and hay land will include grassland planting and management, drainage mains and laterals, and grassed waterways<sup>3/</sup>.

Land treatment measures to be applied to the 50 acres of the urban area include critical area planting, sediment trapping areas, debris basins, forest buffer zones, and the preservation of appropriate natural areas<sup>3/</sup>.

Measures planned for 105 acres of other land are concentrated primarily in the open marshes and along roadways and include mulching of road cuts and wildlife wetland management<sup>3/</sup>.

The time required to install the land treatment measures is 5 years.

### Structural Measures

The structural measures are shown on the project map, appendix B. They include one single-purpose floodwater retarding structure, one multiple-purpose dam for flood protection and fish and wildlife habitat development, fish and wildlife facilities, and about 3,000 feet of channel work, including a grade stabilization structure. The two reservoirs are located in series on Indian Brook in the upland portion of the watershed and will control about 1.45 square miles or about 65 percent of the drainage area.

The two reservoir structures are designed to control the runoff from a 100-year frequency storm with reserve capacity to handle floodwaters from greater storms than the 100-year. The principal spillway designed release rate for the 100-year storm is 88 cubic feet per second at site 1 and is 103 cubic feet per second at site 2. The designed life of the structures is 100 years.

At site 1, the multiple-purpose structure will control about 1.11 square miles of drainage area. The reservoir will provide 176 acre-feet of temporary floodwater storage, 116 acre-feet of water for fish and wildlife habitat and 4 acre-feet for sediment. The designed capacity for sediment storage from the contributing watershed area is equivalent to a rate of 0.0007 inch per year, or 56 tons per year for the 100-year designed life. The beneficial pool, with a surface area of about 52 acres and an average depth of about 2 feet, will be a permanent wildlife marsh.

---

<sup>1/</sup> Cooperative Extension Service, *Forest Road Location and Erosion Control on New Hampshire Soils*, Publication Number 2, 1971.

<sup>2/</sup> United States Department of Agriculture--Forest Service, *Wildlife Improvement Handbook*, January 1969.

<sup>3/</sup> United States Department of Agriculture, Soil Conservation Service, *National Handbook of Conservation Practices*, July 1971.

At site 2, downstream from site 1, a single-purpose floodwater retarding structure will control an additional 0.34 square mile of drainage area. The site will provide 47 acre-feet of temporary storage for floodwater and 1.5 acre-feet for sediment. The volume of sediment from the contributing watershed area to be stored is equivalent to a rate of 0.0008 inch per year, or 21 tons per year for the 100-year designed life. The principal spillway crest at site 2 is planned to maintain the same pool elevation as presently provided by an inactive beaver dam. Sediment accumulation will be stored below this level.

The dams will be built of relatively impervious homogeneous earth fill of glacial till origin and will be placed on rock and glacial till foundations. Excavated material from the emergency spillway at site 2 will provide the fill material needed at both sites. Principal spillways at both sites will be reinforced concrete, type C, straight drop spillways and will be supplemented by vegetated emergency spillways. Figure 1, page 7, illustrates the type of principal spillway to be used at site 1.

At site 1 the principal spillway is designed with a high and low stage. Removable stop logs will permit water level control from a depth of 6 feet up to the low stage crest. This stop log crest will be 3 feet in length and 1 foot lower than the high stage. The high stage crest has an effective length of 10 feet and will extend as a concrete headwall on each end of the stop logs to the sidewalls of the spillway.

The same type spillway is planned at site 2 except that the principal spillway has one stage with a crest length of 6.5 feet. The crest of the stop logs will be at the same elevation as the crest of the concrete headwall on each end of the stop logs.

The water level of the beneficial pool at site 1 and the sediment pool at site 2 will be controlled at the principal spillway by the use of stop logs. The stop logs at site 1 will be used to regulate the water level on a schedule that will be most beneficial for wildlife habitat. The stop logs at both sites will be used for emptying the reservoir for future maintenance. Floodwater detention storage will be provided at both sites above the water level elevation controlled by the stop logs.

Geologic investigations have determined that the two low earth dams have bedrock and compact glacial till, respectively, in their foundations. The embankment design considers the use of mixed granular material for drainage. No active faults are known to exist at the sites. Earthquake risks of the proposed works are considered to be minor.

During the plan formulation stage, recreational and fish and wildlife needs were considered in the watershed streams and impoundment sites. A fish and wildlife marsh development was selected as a purpose along with flood prevention at site 1. A second, single-purpose, flood prevention structure was selected at site 2.

Public access will be provided at site 1 by acquiring additional land around the site. The water stored for fish and wildlife at the site is proposed mainly for wildlife habitat development and protection. The New Hampshire Fish and Game Department has facilities planned for the site

which will allow use of the resource with a minimum of environmental disturbance. A boat launching area, access road and a parking area are planned with the idea of blending man's influences into the development as inconspicuously as possible (see figure 2, page 9). The Fish and Game Department feels that in view of the type of use anticipated for the fish and wildlife development, sanitary facilities will not be necessary. Water quality conditions will be monitored by the Fish and Game Department and, if conditions warrant modification, the Department will install sanitary facilities. The access road to site 1 will utilize the bed of an abandoned logging railroad.

At site 2 potential exists for recreation and fish and wildlife use under present conditions. This includes a minor amount of hunting and nature observation. This potential will not be materially changed by the installation of the structure. In planning the project the principals concluded that the potential for recreation and fish and wildlife use did not justify acquisition of land rights in fee title for public access to the site, nor the expense of monitoring to preclude development of unsanitary conditions and impairment of water quality. For these reasons, public access will not be available to site 2.

About 3,000 feet of channel work is proposed as an essential part of this plan to improve the water carrying capacity of Indian Brook through the Lancaster urban area. At present, Indian Brook in this area is a natural, perennial stream, except where modified by road and railroad crossings and in the vicinity of the mobile home park where about 550 feet of channel work was done by the Town of Lancaster in the fall of 1973. Flooding occurs frequently due to the low water carrying capacity of the present stream channel. In recent times flooding has occurred on an average of once in every 3 years.

The channel will be enlarged by excavation following closely the alignment of the existing channel. The work will start at the upper end of the urban area about 1,300 feet upstream from Summer Street and proceed downstream through the urban area to a point just above U. S. Route 3. At the upstream end of the channel work a grade stabilization structure will be installed. In the present damage area, 66-inch culverts will be used to replace the three street and two railroad conduits to pass the designed channel flow. Riprap will be placed around culverts where allowable velocities may be exceeded.

The modified channel will have a bottom width of 6 feet, a depth of 6 to 7 feet, side slopes of 1.5 to 1 and a top width ranging from 24 to 27 feet.

The channel will be constructed in very loose, fine to coarse sand, muck, organic silt and silt. No bedrock is anticipated in this area. Because of the type of materials and the high water table, unstable side slopes are expected to exist for a short time after construction. Construction techniques, such as pilot channel excavation followed by excavation to approximate final channel cross section, will be used to reduce this problem.



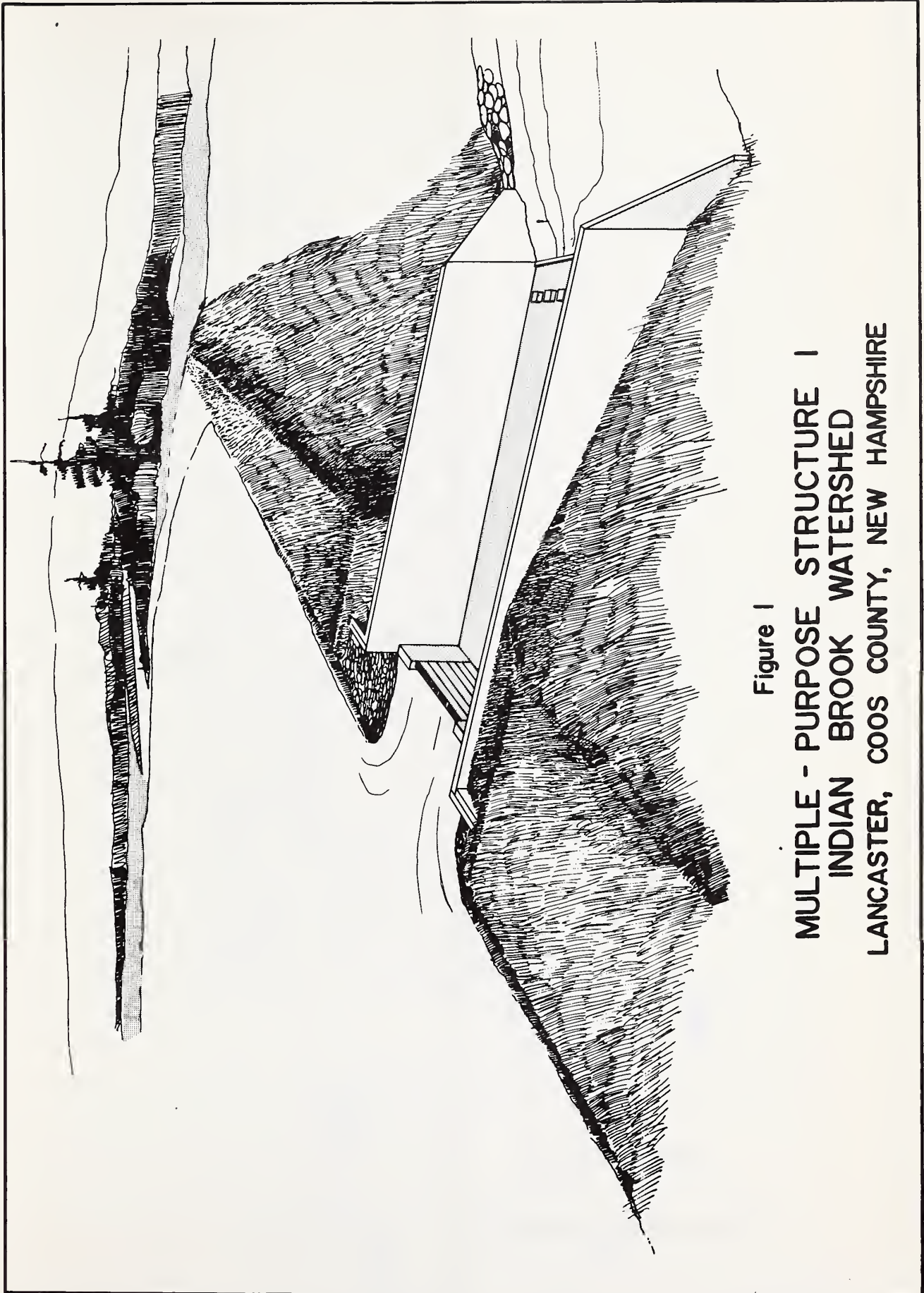
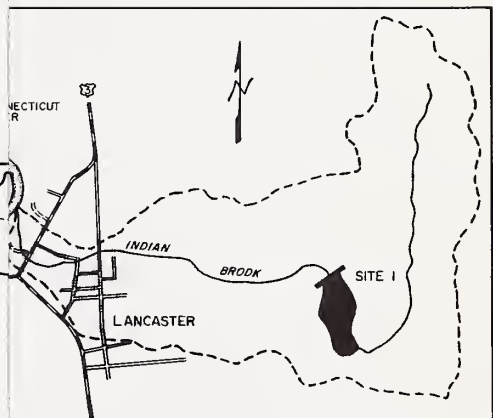
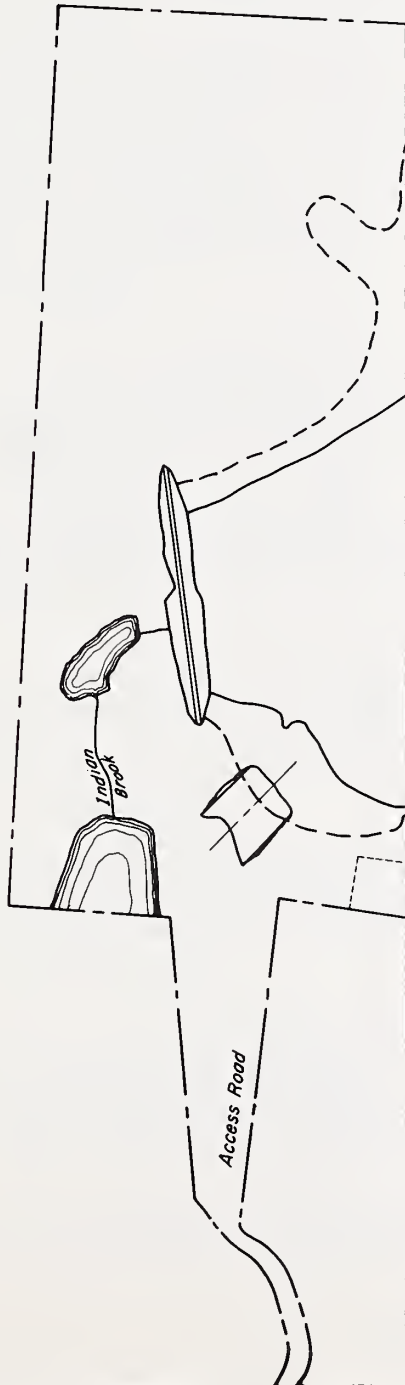


Figure 1

MULTIPLE - PURPOSE STRUCTURE I  
INDIAN BROOK WATERSHED  
LANCASTER, COOS COUNTY, NEW HAMPSHIRE





LOCATION MAP



Figure 2

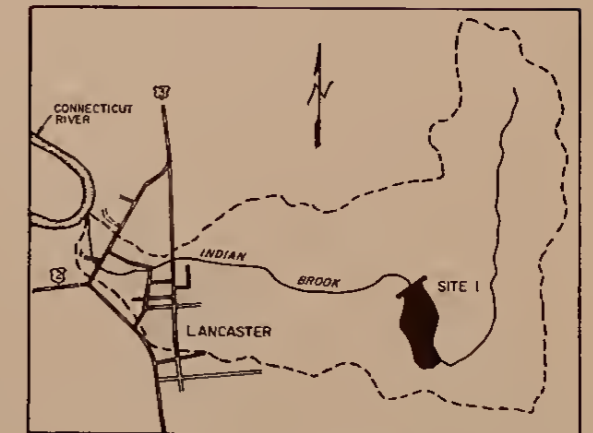
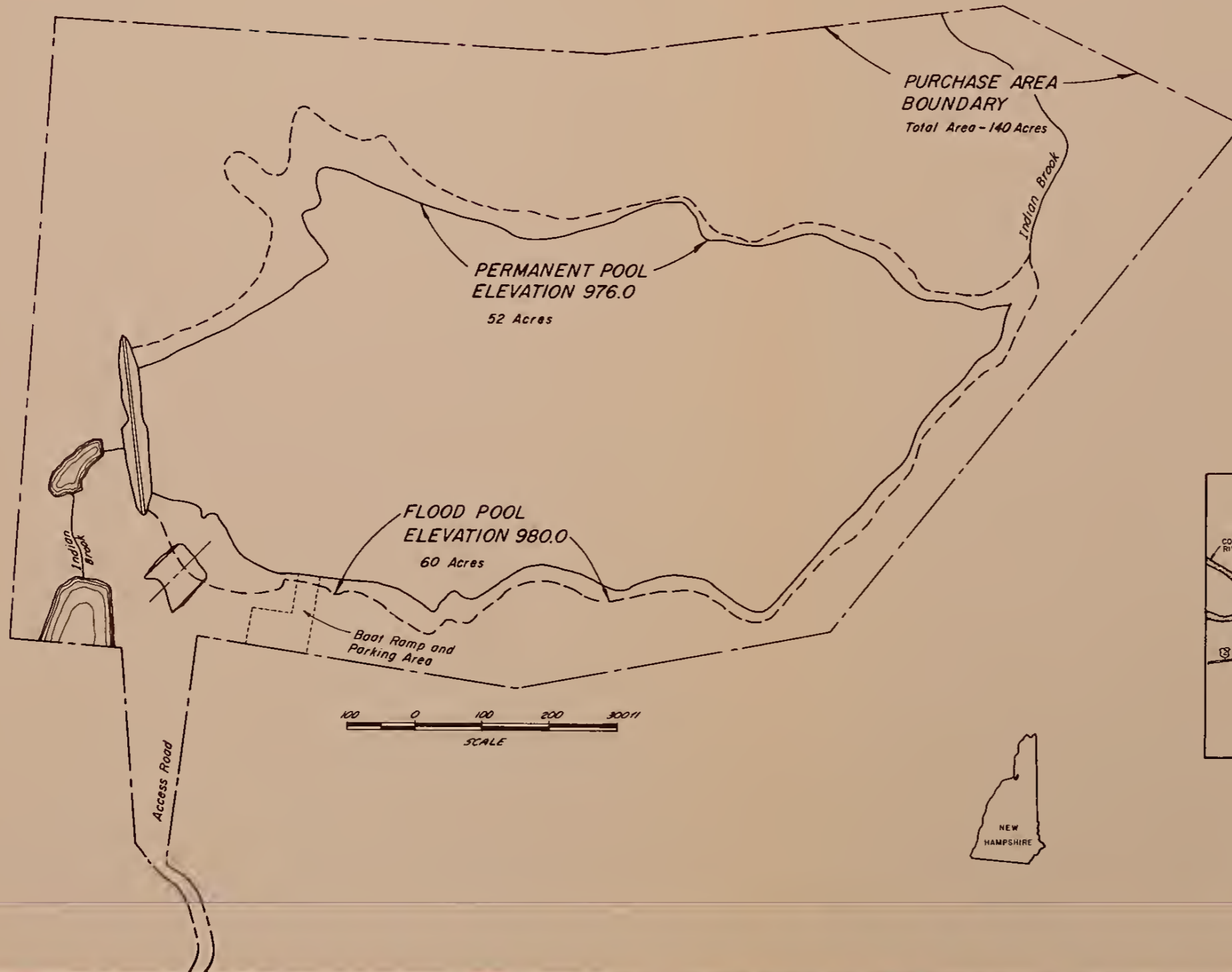


# INDIAN BROOK WATERSHED

COOS COUNTY, NEW HAMPSHIRE

SITE NO. 1

FISH AND WILDLIFE DEVELOPMENT



LOCATION MAP

Figure 2

The time required to install the structural measures is 2 years.

The access road to sites 1 and 2 will follow the route of the old Kilkenny Railroad. Following construction, appropriate signing will call to the attention of visitors the existence and history of the railroad. In the vicinity of the sites the access road and a new trail will maintain the continuity of the trail system.

In the village area an existing granite split stone culvert on the Boston and Maine railroad spur will be removed when the channel is constructed. The existence of the culvert will be documented through drawings and description. If possible, the granite blocks will be salvaged.

The project actions involving the culvert and the railroad bed have been recommended by the historic preservation officer and historical consultant. If other archeological or historic values are uncovered or brought to the attention of the Soil Conservation Service during future investigations or construction, procedures in the Archeological and Historical Preservation Act (PL 93 291) will be followed. The New Hampshire Historic Preservation Officer and the Regional Director of the National Park Service in Philadelphia, Pennsylvania, will be notified. In addition the Regional Director of the National Park Service will be notified prior to the initiation of reservoir construction as required by PL 93 291.

The Soil Conservation Service will follow the requirements of Executive Order 11593, dealing with the protection and enhancement of the cultural environment.

Since this is a federally assisted local project there will be no change in the existing responsibilities of any federal agency with respect to archeological and historical resources. However, planning on this project has followed procedures, as instituted in consultation with the Advisory Council on Historic Preservation, to deal with nonfederally owned sites.

#### Land Use Changes

The development at site 1 will encompass about 140 acres, of which 22 acres is presently in shallow marsh and woodland. Water levels in the marsh are dependent on beaver activity which has been intermittent over the past few years. The marsh also supports mink, muskrat, and waterfowl. The surrounding woodland of hardwoods and conifers provides habitat for grouse, hare and deer.

With the project, the 22 acres of marsh will remain undisturbed. Thirty acres of woodland will be inundated by the fish and wildlife pool and will combine with the 22 acres of existing marsh to make up a 52-acre shallow marsh. The habitat lost will affect mostly snowshoe hare. An additional 8 acres of woodland will be temporarily inundated by the flood

The grade stabilization structure to be installed at the head of the channel work will drop the water about 6 feet and provide for channel installation on a nonerosive grade. The structure will be a reinforced concrete, type C, straight drop structure. The 11-foot weir provides for a flow of 165 cubic feet per second. It will be similar in appearance to the structure shown in figure 1, page 7, except that the concrete headwall will be built without stop logs. The structure will be an "island-type", designed to pass the design flow through the drop spillway and fill the channel to bankful. Excess flows will pass around the structure in an emergency spillway at nonerosive velocities.

The capacity of the planned channel is sufficient to pass the 100-year storm within bank. The design discharge is based on the uncontrolled drainage area below the proposed reservoir sites plus the principal spillway discharge from the reservoirs. The reservoirs will provide sufficient floodwater storage to protect Lancaster when acting as a part of a system which includes the channel work. Downstream from the channel work, Indian Brook flows through a tree-lined channel within the Connecticut River flood plain. As the brook is deeply entrenched, there will be no induced flood damages even though peak discharges for the 100-year storm will increase from 121 cfs to 191 cfs when the project is installed. (See figure 3, page 13, for the effects of flooding with and without project.)

Measures to control and minimize soil erosion, and water, air and noise pollution at the three construction sites will be included in the construction contracts. Construction areas will be revegetated promptly. Temporary culverts will be installed for construction equipment to cross the brook in the construction areas. A sediment trap will be installed below each construction site to catch initial sediment. To control sediment, channel excavation and spoil spreading will proceed simultaneously and temporary seeding of the disturbed areas will be done at the end of each day's work.

Dust will be kept within tolerable limits on haul roads. Pollution of surface areas or ground water by chemicals, fuel, lubricants, sewage and other pollutants will not be permitted. Clearing and disposal of brush and vegetation will be carried out in accordance with applicable laws, ordinances and regulations.

Requirements for safety and health in conformance with the Federal Construction Safety Act will be included in each construction contract. The design and construction of all measures will comply with applicable state water laws and regulations.

All construction areas devegetated and exposed will be graded to slopes suitable for revegetation and permanent seeding mixtures of grasses and legumes will be planted and mulched. Where consistent with planned functions, native shrubs will be planted on construction sites to provide protective cover and restore the areas to a natural setting.

Instituting the recommended measures in the Indian Brook watershed will not cause the displacement of any person, business or farm operation.

The time required to install the structural measures is 2 years.

The access road to sites 1 and 2 will follow the route of the old Kilkenny Railroad. Following construction, appropriate signing will call to the attention of visitors the existence and history of the railroad. In the vicinity of the sites the access road and a new trail will maintain the continuity of the trail system.

In the village area an existing granite split stone culvert on the Boston and Maine railroad spur will be removed when the channel is constructed. The existence of the culvert will be documented through drawings and description. If possible, the granite blocks will be salvaged.

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The Soil Conservation Service will follow the requirements of Executive Order 11593, dealing with the protection and enhancement of the cultural environment.

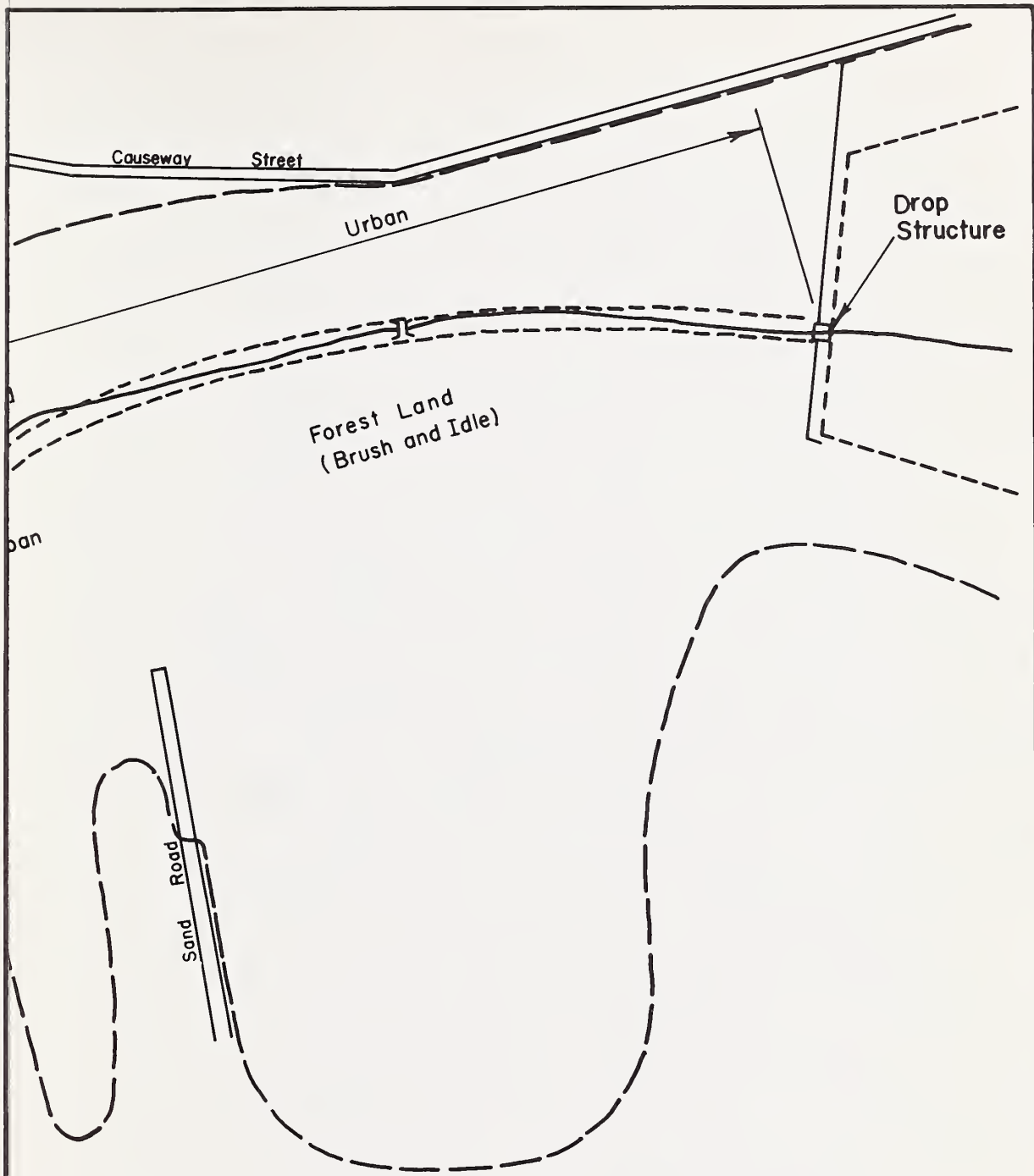
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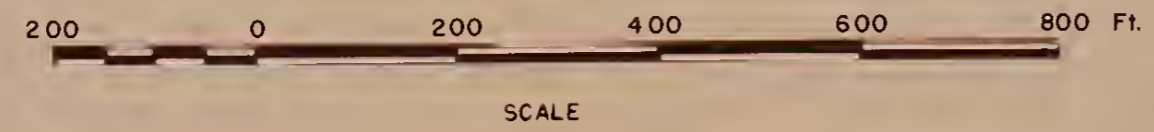
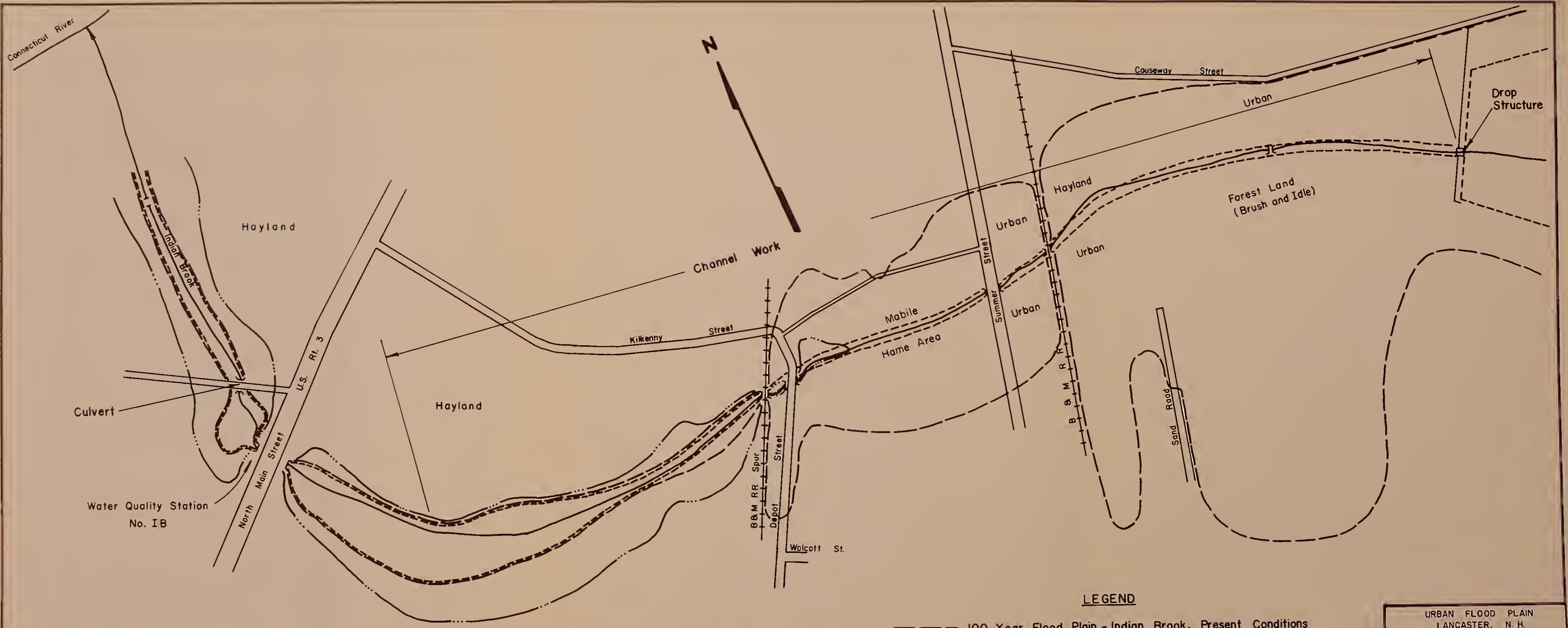
**LEGEND**

- Indian Brook, Present Conditions
- Indian Brook, With Project
- Connecticut River

URBAN FLOOD PLAIN LANCASTER, N. H. INDIAN BROOK WATERSHED	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Date Designed <i>S. Stevens</i> 5/70	Approved by _____ Title _____
Drawn <i>M. Johnson</i> 5/70	Title _____ Sheet _____ Drawing No. _____
Traced _____ Checked _____	No. _____ of _____

Figure 3





- LEGEND**
- 100 Year Flood Plain - Indian Brook, Present Conditions
  - - - - 100 Year Flood Plain- Indian Brook, With Project
  - ..... 100 Year Flood Plain- Connecticut River

URBAN FLOOD PLAIN LANCASTER, N. H. INDIAN BROOK WATERSHED			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	Date	Approved by	
Drawn	5/70	Title	
Traced	5/70	Sheet	Drawing No.
Checked		No. 1	of 1

Figure 3



pool. About 10 acres of woodland will be required for the construction of the dam, appurtenances and the adjoining work area. This will be maintained in a grass-legume vegetative cover following construction. The remaining 70 acres of woodland will be purchased as a protective buffer zone around, and for access to, the marsh. The entire 140 acres will be available for public use.

Thirty acres of land is required to install, operate and maintain the structure at site 2. Of this acreage, 7 acres is presently occupied by an abandoned beaver flowage, 7 acres is woodland and about 16 acres is marshland. The beaver flowage and marshland provide habitat for mink, muskrat and waterfowl, while the woodland provides habitat primarily for hare and deer.

With the construction of the project, the 7-acre beaver flowage will remain intact. The 7 acres of woodland will be cleared and used for the dam and its appurtenances and for temporary construction work areas. This area will be seeded to a permanent mixture of grasses and legumes following construction, providing food and habitat for deer, grouse, hare and ground nesting birds. The marshland will be within the flood-water detention pool and will therefore be temporarily flooded. Flowage easements will be obtained. Because of the limited potential for recreation and fish and wildlife uses, public access at site 2 is not planned.

About 7 acres of perpetual easements will be needed for channel excavation, spoil spreading and access for operation and maintenance. The present channel occupies about one-half acre within this reach. The remainder of the area is made up of the sedge-bluejoint grass community and alder-willow and dogwood thickets. In the reach of channel work, present land use is almost equally divided among hayland, forest land and urban areas. Residential lawns border the stream in the mobile home park and along Summer Street. Wildlife in the area consists primarily of songbirds, woodchucks, skunks, frogs, toads, and muskrats. No significant fishery has been found in the stream; minnows are the most abundant species.

After construction, the channel will occupy about 2 acres. The remainder of the area will be planted to grasses, shrubs and tree seedlings. No change in wildlife or fish species is expected.

Of 50 acres susceptible to flooding, 30 acres in the Lancaster urban area will be protected from the 100-year flood. Included in this area are approximately 13 acres of residential development and 17 acres of forest and hay land, which is interspersed within existing development. This land will probably convert to urban use. Approximately 3 acres outside but adjacent to the flood plain are also expected to convert to urban use from forest land. An additional 30 acres within the watershed but outside the flood plain are expected to convert from cropland to urban use whether or not the project is installed.

TABLE 1  
Land Use Within Indian Brook Watershed  
Acres

Land Use	Present Conditions	Future Conditions Without Project	Future Conditions With Project
Cropland	55	20	20
Forest land	1,190	1,195	1,145
Urban	75	105	125
Water	100	100	130
<b>Total</b>	<b>1,420</b>	<b>1,420</b>	<b>1,420</b>

TABLE 2  
Land Use Within the Flood Plain  
of Indian Brook Watershed  
Acres

Land Use	Present Conditions	Future Conditions Without Project	Future Conditions With Project
Cropland (Hayland)	5		
Forest land	32	37	20
Urban	13	13	30
<b>Total</b>	<b>50</b>	<b>50</b>	<b>50</b>

#### Operation and Maintenance

The land treatment measures installed in the watershed will be operated and maintained by the landowners or operators. Technical assistance, made available through the Coos County Conservation District, will be provided by the Soil Conservation Service, the New Hampshire Cooperative Extension Service, and the Division of Resources Development in cooperation with the U. S. Forest Service.

Operation and maintenance of all structural measures will be the responsibility of the sponsors. The Town of Lancaster will operate and maintain the channel work. Funding will be provided through the Town's annual operation and maintenance budget appropriation.

The New Hampshire Water Resources Board will operate and maintain the dam, principal spillway and emergency spillway at each of the two reservoir structures except for the operation of the stop logs at structure 1 which are associated with the fish and wildlife water resource. The Board has been authorized and funded in the past to operate and maintain flood prevention structures in PL 566 projects for which the Board is a sponsor.

The New Hampshire Fish and Game Department, through its regular appropriation, will operate and maintain the fish and wildlife water resource and facilities associated with structure 1. The Department will operate the stop logs at structure 1 to control the water level for proper management

of fish and wildlife habitat in the marsh. Fish stocking and management of fish and wildlife at site 1 will also be the responsibility of the Department. The Department will be assisted by the Town of Lancaster in the maintenance of the access road, parking lot and boat ramp.

The operation and maintenance of the fish and wildlife development at site 1 will conform to the requirements of the Division of Public Health Services and the Water Supply and Pollution Control Commission which act as regulatory agencies in such matters. It is expected that sanitary facilities will not be needed since the New Hampshire Fish and Game Department projects a low density of use. The Department will monitor use at the site, however, and if its surveys indicate sufficient use to require sanitary facilities, the Department will provide facilities which comply with all local and State laws dealing with public health, water quality and environmental quality.

The annual operation and maintenance cost for all structural measures is estimated to be \$1,900. Routine maintenance of the channel will include removal of debris from culverts, upkeep of channel bank vegetation, and repair as needed of the concrete work in the grade stabilization structure. This will require \$1,300 annually. Maintenance of the dams will require \$600 annually and will include removal of floating debris from the reservoirs, preservation of earth embankment and emergency spillway vegetation, and repair as needed of the concrete work in the principal spillways.

The cost to operate and maintain the fish and wildlife facilities is estimated to be \$1,300 annually. This will include keeping the access road, parking area and boat ramp in good condition for public use and the area clean and free of debris.

Representatives of the Town of Lancaster, the Coos County Conservation District, the New Hampshire Fish and Game Department and the New Hampshire Water Resources Board will inspect the structure annually with additional inspections following any major storm or unusual occurrence that could affect the proper operation of the facilities. During the first 3 years following completion of the project the Soil Conservation Service will assist in these inspections. After the third year the sponsors will continue the annual inspections. They will prepare inspection reports and submit a copy of each report to the Service. The Service may make inspections at any time to assure proper operation and maintenance.

Dams will be inspected to determine the condition of the embankment, vegetation, principal and emergency spillways and other appurtenances of the structures. The channel and grade stabilization structure will be inspected to determine the condition of the concrete works, the channel bank vegetation, the channel stability, and the culverts. Inspection items at the fish and wildlife facility will include the condition of the access road, boat ramp and parking lot, and the sanitary conditions at the site.

Each operation and maintenance agreement sets an establishment period for structural works of improvement and for associated vegetative work. During the establishment period, the Soil Conservation Service, using PL 566 funds, may cost share on repairs or additional work which result from unknown latent conditions or deficiencies in Service work. Repairs may be cost shared in the same ratio as authorized for the original construction of the specific work involved.

Repairs or additional work which are not eligible for PL 566 financial assistance include work on the basic facilities for fish and wildlife development and work resulting from improper operation and maintenance.

The appropriate sponsor and the Service will execute an operation and maintenance agreement prior to the signing of any project agreement for a work of improvement. The operation and maintenance agreement will include specific provisions for retention and disposal of property acquired or improved with PL 566 financial assistance. An operation and maintenance plan will be prepared for each structural measure in accordance with guidelines outlined in the New Hampshire Watersheds Operation and Maintenance Handbook<sup>1/</sup> for PL 566 projects.

### Project Costs

The total installation cost for all measures, including technical assistance, is \$331,800. Of this amount the installation cost for land treatment measures is \$80,700 and for structural measures \$251,100. For more detailed breakdown of costs, see table 3 below:

TABLE 3  
Project Installation Costs  
(Dollars)

Item	PL 566	Other	Total
Land Treatment	12,200	68,500	80,700
Structural Measures	168,900	82,200	251,100
(Subtotal Construction)	(137,300)	(20,400)	(157,700)
<b>TOTAL</b>	<b>181,100</b>	<b>150,700</b>	<b>331,800</b>

<sup>1/</sup> United States Department of Agriculture, Soil Conservation Service, *New Hampshire Watersheds Operation and Maintenance Handbook*, April 1971.



## ENVIRONMENTAL SETTING

### Physical Resources

Indian Brook watershed is located in the town of Lancaster, Coos County, in northern New Hampshire. It lies on the northwestern fringe of the White Mountain National Forest about 110 miles north of Concord, New Hampshire and is within the Connecticut River Basin. Approximately 250 people live in the 2.2 square mile (1,420 acre) area of the watershed.

According to the delineations of the Water Resources Council<sup>1/</sup>, Indian Brook watershed lies within the following:

Water Resources Region: New England (01)  
Water Resources Subregion: The Connecticut River (08)  
Major Land Resource Area: Northeastern Forage and Forest Region (R)  
Land Resource Subarea: New England and Eastern New York Upland (144)  
Land Resource Group: Northeastern Mountains (66)  
OBE Economic Area: Burlington, Vermont (003)

The above land use and land resource categories describe the Indian Brook watershed as a region of forest and pasture or hay land.

Indian Brook poses specific problems that are of concern to local residents. The primary problem in the watershed is flooding along Indian Brook in the urban area of Lancaster. The problem area comprises about 50 acres of flood plain land containing about 5 acres of pasture and hay land, 13 acres of urban area and 32 acres of forest land. Although minor in comparison, accompanying erosion and sedimentation in the urban area augments the problem. The greatest damage occurs in residential areas although some transportation and agricultural damage also occurs.

There are three major soil groups in the watershed<sup>2/</sup>. Ten percent of the watershed area (the Connecticut River flood plain and terraces) contains silty and sandy loams well-suited for agriculture, recreation areas, and in areas not susceptible to flooding, urban development. About 25 percent of the watershed, primarily along Indian Brook, is characterized by poorly to very poorly drained sandy loam soils. The remaining 65 percent has been formed in stony glacial till and is found on the hilly uplands. Due to their wetness, stoniness, and steep slopes, both the wetland and hilly upland soils are best suited for wildlife habitat development and forestry use.

The upland area is generally covered with a dense, relatively impervious glacial till. Granitic bedrock is encountered at shallow depths and bedrock outcroppings are visible.

<sup>1/</sup> Water Resources Council, *Water Resources Regions and Subregions for the National Assessment of Water and Related Land Resources*, Washington, D. C., July 1970.

<sup>2/</sup> U. S. Department of Agriculture, Soil Conservation Service, *General Interpretative Soils Report for the Town of Lancaster, Coos County, New Hampshire*, February 1970.

The geology of the valley differs from the upland area. Geological investigation along the lower reaches of Indian Brook indicates the presence of very loose, fine to coarse grained, fairly well graded, clean sands overlaid by silt, organic silt and muck. The very loose underlying sands were investigated to a depth of 12 feet. These sands are extremely pervious and saturated with water.

A thick layer of organic soil exists in the marshy areas at the proposed upland area sites. Organic accumulation of 24 feet was typical within the proposed reservoir area at site 1 and measurement of one location indicated an even greater depth. Up to 22 feet of organic accumulation was measured beneath the beaver flowage at site 2.

The maximum relief of the watershed is 420 feet. The highest point is 1,250 feet above sea level at the top of Page Hill. The lowest point is 830 feet at the confluence of Indian Brook with the Connecticut River.

There are no known mineral resources of commercial value in the watershed. No potential for ground water development in the watershed was identified in the Connecticut River Basin Study<sup>1/</sup>.

The watershed is located in Algermissen's Seismic Risk Zone 2, rated to have moderate damage potential should the area be affected by a major earthquake. Review of records in "*Earthquake History of United States, Part I*", indicates that the area has felt at least eight major earthquakes during the past 300 years. The most recent was in 1929 in the St. Lawrence Valley region, to the north.

The area has a modified continental climate with short, mild summers and long, cold winters. Temperatures range from a low of -40°F to a high of 100°F and the mean January and July temperatures are 16°F and 66°F, respectively. The growing season averages about 109 days and extends from about May 29 to September 15. The average annual precipitation of 37 inches is distributed uniformly throughout the year. However, annual snowfall of about 80 inches accounts for the majority of precipitation during the winter<sup>2/</sup>.

About 1,190 acres, or 84 percent of the area, is forested; 55 acres, or 4 percent, is pasture and hay land; 75 acres, or 5 percent, is urban area; and 100 acres, or 7 percent, is water and marsh. About 200 acres is in forest swamp. (See table 1, page 15.)

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<sup>1/</sup> U. S. Department of the Interior, Geological Survey and U. S. Army, Corps of Engineers, New England Division, *A Reconnaissance of the Groundwater Resources of the Connecticut River Basin*, pp. 18-20.

<sup>2/</sup> Robert E. Lautzenheiser, "*Climate of New Hampshire*", *Climates of the States*, U. S. Department of Commerce, Weather Bureau, November 1959.

The watershed is in an area of northern hardwoods and conifers. The predominant hardwoods are birch, maple, beech and poplar. The conifers are fir, spruce, white pine and larch. Most of the forest land has been logged in the past, but not in recent years.

Cropland in the watershed is used primarily to produce hay for dairy cows.

The Lancaster urban area typifies much of the urban development of rural mountainous New England. Roads and railroads generally follow streams and valleys. Attempts were made to avoid frequently flooded areas, but considerations of economics and engineering made this impractical in some instances. Residential and commercial areas developed in strips and clusters along the roads with the main villages at major crossroads.

The main village of Lancaster is situated at the intersection of U. S. Highways 2 and 3 and is served by the Boston and Maine Railroad. The village includes 75 acres of the watershed area, developed for urban use in varying degrees. This includes 13 acres of residential area within the Indian Brook 100-year flood plain.

Indian Brook originates as an intermittent stream in the vicinity of Page Hill. It flows south about 2 miles, turns north-northwest through a series of beaver flowages and, at this point, becomes a perennial stream. The stream then turns west again, flows through the urban area and enters the Connecticut River. The stream follows a natural, unmodified channel for most of its course, but in the broad flat areas the channel is almost undefined. At times, beaver ponds of varying sizes have occupied some upstream reaches. Within the urban area, about 550 feet of the stream have been modified by dredging. In this area the stream is a well defined channel 5 to 10 feet wide and 2 to 3 feet deep. The channel is bordered generally by hayland or residential lawns with alders growing on the streambank. In the urban area four road bridges and two railroad bridges cross the brook. Further downstream it enters the flood plain of the Connecticut River in a deeply-entrenched, tree-lined channel.

The Town of Lancaster has a public sewer system which serves the village area of the town. A secondary level of treatment is accomplished by a system of stabilization ponds. Design specifications are as follows:

Dry weather sanitary flow	0.4 MGD (million gallons per day)
Peak sanitary flow	2.4 MGD
Combined sewer peak inflow	26.6 MGD
Population (maximum)	4,000 persons

The system is presently working at about one half its design capacity and serves about 2,000 persons.

Collection mains have recently been extended to serve the part of town in the area of Indian Brook. Eventually, all residents in this area are expected to connect onto the system. Until they do they will continue to use septic systems for waste disposal. The Town requires all new development in the service areas to tie into the public system.

In the urban area the brook is subject to effluent discharges from inadequate septic systems, especially during periods of high runoff or prolonged wetness. Septic systems operate during dry periods of the year when the water table is drawn down, but may become inoperative during and after stages of high streamflow which raise groundwater levels to near the surface of the land.

The New Hampshire Water Supply and Pollution Control Commission<sup>1/</sup> has classified Indian Brook as a Class B stream. Waters of streams in this classification are acceptable for bathing and recreation, fish habitat, and public water supply after adequate treatment. However, water quality has been impaired within the urban reach of Indian Brook by the effluent from inoperative septic systems during wet periods.

The New Hampshire Water Supply and Pollution Control Commission has sampled Indian Brook in Lancaster below the Route 3 bridge and reports on the following properties:

Date collected	September 10, 1973
Temperature	12.0°C (53.6°F)
Total coliform	32 count per 100 ml
Biochemical Oxygen Demand - 5 day	1.0 mg/l
Dissolved oxygen	5.9 mg/l
Dissolved oxygen saturation	55%
pH	6.4 units
Alkalinity as CaCO <sub>3</sub>	28 mg/l
Cadmium Cd	< .05 mg/l
Calcium Ca	12.0 mg/l
Chloride Cl	1.1 mg/l
Color	160 units
Copper	< .05 mg/l
Flouride F	< .1 mg/l
Hardness CaCO <sub>3</sub>	56 mg/l
Iron Fe	6.3 mg/l
Magnesium Mg	2.6 mg/l
Magnesium Mn	.16 mg/l
Nitrogen (Ammonia)	.125 mg/l
Nitrogen (Nitrite)	.018 mg/l
Phosphorus (Ortho)	.036 mg/l
Phosphorus (Total)	.097 mg/l
Sodium Na	13.5 mg/l

<sup>1/</sup> New Hampshire Water Supply and Pollution Control Commission, "Standards for Classification of Surface Waters of the State," *New Hampshire Revised Statutes Annotated*, Volume 2, 1972 Supplement, p. 220.

Specific Conductivity	150 micro-mhos
Sulfate SO <sub>4</sub>	14.5 mg/l
Total solids	123 mg/l
Suspended solids	6 mg/l
Turbidity	10.0 JTU
Zinc Zn	.20 mg/l

In addition a considerable amount of fiber was found floating in the water. Plankton identification included a few unidentified flagellate and ciliate protozoa and an unidentified species of euglena. Streamflow was low at the time the sample was taken.

The Environmental Protection Agency's data bank and the New Hampshire Water Supply and Pollution Control Commission's files have been checked for any existing water quality data on Indian Brook. However, no data were found, and no other known data are available.

Base flows of about 0.2 cfs can be expected at the proposed reservoir sites, with water temperatures in the 60 to 70°F range during the summer months.

Occasionally warm weather and pooling in upstream beaver ponds will warm the water to temperatures above 70°F. There are no normal activities above the proposed sites which will degrade the quality of water. However, the water in the stream is often visibly colored by the organic material in the marshes.

Beaver ponds and marshes are evident along the main stream. Based on criteria provided in U. S. Bureau of Sport Fisheries and Wildlife Circular C-39, 100 acres of wetland would be classified as Type 3 - inland shallow fresh marshes, and 200 acres as Types 6 and 7 - shrub and wooded swamp areas<sup>1/</sup>.

Septic systems which contribute pollutants during periods of high streamflow are the only known point sources of pollution. No dairy cattle are fed or housed in the watershed.

Pollution from nonpoint sources could result from use of fertilizer on the 55 acres of pasture and hay land and from the use of fertilizers and pesticides in the urban area.

#### Plant and Animal Resources (Flora and Fauna)

The watershed provides a range of habitat for many species of wildlife. About 84 percent of the watershed is in woodland, predominantly northern hardwoods and conifers. The plant community consists of maple, beech, and birch, interspersed with spruce, fir and white pine. The pure conifer

<sup>1/</sup> U. S. Department of the Interior, Fish and Wildlife Service, *Wetlands of the United States*, Circular 39

stands are more boreal in makeup: black spruce, white spruce, red spruce and fir-balsam predominate. Growth is dense and heavily shaded, with limited understory. This furnishes habitat for snowshoe hare, red squirrels, white-footed deer mice, warblers, ravens, and northern songbird species.

Within the woodland areas there are approximately 50 acres of pastures that were abandoned about 30 years ago. This land is in a stage of succession, going from grassland to woodland and provides excellent habitat for deer, grouse, woodcock and snowshoe hare. Vegetative cover is primarily juniper, white pine, birch, poplar and spruce-fir. Shrubs include hawthorn, red osier dogwood, raspberry and highbush cranberry. Small openings still exist which support grasses and forbs.

Two powerlines pass through the watershed and provide about 100 acres of open areas within the forest land. Vegetative cover within the powerline rights-of-way consists mostly of grasses and shrubs. These areas provide wildlife habitat for deer, grouse, woodcock and snowshoe hare.

The 100 acres of Type 3-inland shallow fresh water marsh provides habitat for waterfowl and furbearers. With water levels often maintained by beaver, these areas are used by mink, muskrat, black duck, wood duck, teal and golden eye ducks. Waterfowl are attracted into the watershed since it is along the Connecticut River flyway.

In the lower reaches of the watershed, 75 acres of residential land and 55 acres of pasture and hay land prevail. Alder-willow and dogwood thickets are interspersed through the area and along the stream. The open reaches along the stream are made up of a sedge-bluejoint grass community. The stream through this area is about 5 to 10 feet wide and has about one-half acre surface area.

The wildlife community along the urban reach consists of many songbirds, especially those in the warbler and sparrow families. Other species are woodchucks, skunks, field mice, shrews, frogs, toads, muskrats and garter snakes.

As a perennial stream, Indian Brook originates in the existing marsh at site 1 (see project map, appendix B). The area at site 1 is primarily marsh habitat with a dense cover of bluejoint, sedges and shrubby growth. At present the stream is dead water varying in maximum depth from 3 to 4 feet. The dead fir and larch scattered throughout site 1 show a history of varying water levels created by beaver activity. The marsh has a north-south aspect. To the east and west the cover is typically swamp with dense stands of fir and spruce growing on raised hummocks. Ground cover is sparse and is mostly sphagnum moss and associated plants such as bunchberry, snowberry and sorrel.

A beaver dam at one time flooded an area of about 7 acres at site 2, the lower marsh, but the beaver activity has ceased there in recent years. The pond is now shallow and filled with aquatic vegetation such as pondweed and duckweed. The shallow areas are covered with marsh grasses, sedges and brush.

Waterfowl are present in both marshes in the fall and some nesting takes place in the spring. A deeryard is located on the perimeter of site 1. Signs indicate a fair population of snowshoe hare around the perimeter and in the marsh habitat. There is some evidence of mink and muskrat activity; beaver activity is low.

Below site 2 the stream flows on a steep gradient, primarily through forest land. The stream is narrow in this reach and is characterized by a rocky and gravelly bottom.

The slope of the stream flattens as it passes through the urban area. The streambed is made up of sands and gravels. The New Hampshire Fish and Game Department places low significance on fishery values in this urban reach of the stream. While Indian Brook is described as a perennial stream, the summer flows in this reach are frequently very low or nonexistent and water remains only in small, shallow pools. In addition, the water quality is oftentimes poor. Effluent discharging from residential septic systems and a noticeably high coloration frequently impair the quality of the water.

In Indian Brook minnows are the most abundant species of fish, but the brook may also support some native brook trout in the upstream reaches. Suckers use the stream to some extent for spawning. Stream - fishing - use figures have not been reported because the Fish and Game Department does not consider the stream suitable for trout stocking.

The remote, upland forested areas in the watershed are accessible by logging roads and an old logging railroad bed which generally follows the course of the stream. Most of the watershed land is accessible for hunting and fishing.

The white-tailed deer is of primary importance in the watershed. It is estimated that the deer population is 15<sup>1/</sup> and according to estimates by biologists of the New Hampshire Fish and Game Department, seven of the deer occupy the yard adjacent to the marsh area near site 1. The deer kill for 1971 in the town of Lancaster was about 1.52 per square mile<sup>2/</sup>. This indicates that three deer could have been taken from the watershed.

1/ New Hampshire Fish and Game Department, *The White Tailed Deer of New Hampshire*, Survey Report #10, 1968.

2/ New Hampshire Fish and Game Department, *"Deer Kill"*, 1972, *New Hampshire Fish and Game Department Annual Report*.

The grouse population in Coos County has shown some increase in the last few years. The New Hampshire Fish and Game Department reported a sighting of 87 grouse per 100 miles of census line in northern New Hampshire<sup>1/</sup>. Since the population of grouse is cyclic, exact populations are difficult to determine; but during periods when the grouse population is increasing average population figures indicate 75 to 100 grouse in the watershed.

Based on average population levels for similar areas, it is estimated that 50 hare inhabit the watershed. As with grouse, the population is cyclic and exact numbers are difficult to determine.

Habitat is available for some typically northern species of birds not found in the southern part of the state. Species such as the northern shrike, Arctic three-toed woodpecker, loon, raven and Canada jay are present and attract many observers.

There are no known rare or endangered species in the watershed.

#### Economic Resources

The economy of the Lancaster area is based on four major activities: farming, forestry, recreation and manufacturing.

There are parts of four dairy farms in the watershed. These farms average about 50 acres in size. Farming as a whole is a major source of income to many landowners in the region. The primary crops are hay and corn.

The majority of the land in the watershed is forested and has potential for timber production. It has been logged in the past, and logging will probably continue in the future. Hardwood sawlog and pulpwood markets are excellent as are the markets for most softwood products. The manufacture of wood-related products is the major employment source in the region.

The watershed population is about 250 persons, 100 of which live on the flood plain. The population in the town of Lancaster was 3,166 in 1970 according to the Bureau of Census figures, an increase of 28, or 1 percent, from 3,138 in 1960. In comparison, the population of Coos County was 34,291 in 1970, a decrease of 2,849, or 8 percent, from 37,140 in 1960<sup>2/</sup>. Population projections for the town of Lancaster indicate a population of 3,300 by 1990 and 3,700 by the year 2020<sup>3/</sup>, a growth rate of about 0.3 percent.

<sup>1/</sup> New Hampshire Fish and Game Department, *Grouse, Long Line Summer Census, 4/1/71 to 3/31/72*. Project No. W-9-R-25.

<sup>2/</sup> U. S. Department of Commerce, Bureau of the Census, *1970 Census of Population, Number of Inhabitants, New Hampshire*, March 1971, p.31-15.

<sup>3/</sup> William Dickson Associates, Inc., *Lancaster, New Hampshire Town Plan*, 1970, p. 28.



Employment within the watershed is limited to three commercial establishments and farming and logging operations. Lancaster and the surrounding towns are the major employment centers in the area.

The majority of land in the watershed is privately owned. Public ownership is limited to about 150 acres of town forest. Outside the urban area there are about 20 landowners, four of whom are farmers.

Land value in the upland wooded areas runs at about \$100 per acre. Flood plain land in the lower reaches of the watershed, which is primarily forested wetland, is valued at about \$50 per acre. One-fourth acre house lots with public water and sewer sell for about \$1,200.

Over the years, much of the North Country of New Hampshire, including the Lancaster area, has experienced an outward migration of its younger people primarily because of the lack of employment opportunities. The closing of some wood product manufacturing operations has reduced manufacturing jobs and the opportunities for work in the woods. The increased mechanization necessary to compete in today's markets further reduces manpower needs.

Although employment data for the watershed or the town of Lancaster is not available, data is available for Coos County. The downward trend in employment opportunities can be seen from data gathered by the New Hampshire Department of Employment Security for the 1955-1963 period. Covered employment (employment covered under the Federal Employment Security Act) for this period dropped from 9,287 to 7,702 within Coos County<sup>1/</sup>. This has stabilized, however, as employment through 1969 remained in the 7,800-7,900 range<sup>2/</sup>. Underemployment, indicating the lack of year-round employment, exists in the county. Because of the summer tourist and recreation business, the labor force and employment opportunities in the county fluctuate. A special compilation by the Department of Employment Security for the summer of 1963 revealed that the labor force within Coos County numbered about 17,100 of which 2,700 persons were temporary residents from outside the county. The total number employed was about 16,450, resulting in an unemployment rate of 3.8 percent. During the following winter, from December to April, the labor force was about 14,300 with 13,240 being employed, resulting in a 7.4 percent unemployment rate<sup>3/</sup>.

1/ New Hampshire Department of Resources and Economic Development, *Coos County New Hampshire Comprehensive Plan, Phase I, 1965*, p. VIII-26.

2/ William Dickson Associates, Inc., *Lancaster, New Hampshire Town Plan, 1970*, p. 28.

3/ New Hampshire Department of Resources and Economic Development, *Coos County, New Hampshire Comprehensive Plan, Phase I, 1965*, p. VIII-18.

The median income of \$8,137 for families in Coos County and \$7,967 in Lancaster is less than the state average of \$9,698 as reported by the 1970 U. S. Census of the Population<sup>1/</sup>. Factors related to the lower level of income are a high dependency ratio, high rates of unemployment and underemployment, low self-employment income, a relatively large number of elderly people on fixed incomes, a relatively small number of people receiving interest and dividend income and few employment opportunities for women<sup>2/</sup>.

Historically, agriculture and lumber industries have dominated the economy of the region. Agriculture has declined. The lumber and wood product industries remain a significant factor employing about 30 percent of the labor force<sup>3/</sup>. There has also been growth in the smaller, more diversified industries. The continued growth of the recreation and tourist industries holds significant potential for the area's development.

An adequate transportation system connects the town, farms and markets. U. S. Routes 2 and 3 join within the watershed boundaries, and the town is about 30 miles from I-93 and I-91. Two railroad tracks cross the watershed.

The watershed is within an area designated as a "redevelopment area" under Title IV of the Public Works and Economic Development Act of 1965<sup>4/ 5/</sup>. It is also in the North Country Resource Conservation and Development Project Area<sup>6/</sup>. Improvement of the overall economy of the area has been the objective of the above programs.

### Recreation Resources

Past recreational pursuits in the watershed have been limited to fish and wildlife-related activities. In recent years, however, many of the old logging roads and the abandoned railroad have been used by snow-mobilers during the winter months.

While there are no recreation facilities in the watershed, summer and winter-based activities are available in the town<sup>7/ 8/</sup>. The town of Lancaster has an excellent recreation program financed in part by

1/ U.S. Department of Commerce, Bureau of the Census, *General Social and Economic Characteristics, New Hampshire*, April 1972, pp.31-90 and 31-91.

2/ New Hampshire Department of Resources and Economic Development, *Coos County, New Hampshire Comprehensive Plan, Phase I*, 1965, p.VIII-14.

3/ New Hampshire Department of Resources and Economic Development, *Coos County, New Hampshire Comprehensive Plan, Phase I*; 1965, p.IV-31.

4/ U.S. Congress, Public Works and Economic Development Act of 1965, PL 89-136.

5/ *Program for a Balanced Economy, Overall Development Program for the New Hampshire-Vermont Economic Development District*, 1968.

6/ North Country Resource Conservation and Development Project, New Hampshire, 1968.

7/ William Dickson Associates, Inc., *Lancaster, New Hampshire Town Plan*, 1970, p. 80-1.

8/ State of New Hampshire, State Planning Project, *Inventory of Public and Private Outdoor Recreation Areas - New Hampshire*.

trust funds. The program provides picnic facilities, a swimming pool, a playground, athletic fields, and tennis courts in addition to well maintained parks and open space in the village area. Band concerts are enjoyed by the public during the summer months.

Private recreation areas in the town provide facilities for camping, picnicking, swimming, skiing, biking and snowshoeing. Other facilities are also available in the region, and overcrowding at many of the areas is common.

Within the watershed there is an opportunity for hiking and nature study. The abandoned railroad grade and logging roads provide physical access to the marshes and upland areas.

### Archeological and Historical Resources

Logging operations have been an important part of the history of the Town of Lancaster and northern New Hampshire. The track bed of the former Kilkenny Railroad is one of the visible remnants and is partially located in the watershed. (See project map, figure 4.) The railroad was constructed in 1887 to reach the timber resources in the mountains of Kilkenny to the east. The railroad extended from near Summer Street in the village of Lancaster to a maximum of 14½ miles into the mountains and hauled out logs and sawed timber from a local mill. By 1894 much of the supply of timber had been depleted and activity on the railroad slowed. In 1897 all railroad operations came to an end and the rails were torn up. Today, the railroad is gone but the bed remains. The current use of the bed is as a trail for hiking and snowmobiling and as access to the area for hunters, fishermen and trappers. The Kilkenny railroad bed is a historical and recreational resource to the town<sup>1/</sup>

In the village area there is a granite split stone culvert that carries the Boston and Maine railroad spur over Indian Brook. While similar culverts exist throughout the north country and the State, this culvert is of unique and indigenous material and construction<sup>1/</sup>.

The Connecticut River Valley was a primary settlement area and travel route for the American Indians. There was an Indian settlement on the Connecticut near the mouth of Indian Brook. Literature and field investigation yielded no indication of Indian activity in the upper reaches of the Brook<sup>2/</sup>.

### Soil, Water and Plant Management Status

The majority of the upland portion of the watershed is forested and has been commercially logged in the past. There are no indications that this land use will change in the near future. The wet soils, shallow to bedrock conditions and lack of accessibility to the area will tend to restrain any development.

1/ Fritz Griffin, *Assessment of Historical and Architectural Resources, Indian Brook Watershed*, July 1975.

2/ Charles Bolian, *Archaeological Assessment, Indian Brook Watershed*. 1975.

Urban development is encroaching on agricultural land in the lower reaches of the watershed. Land formerly used for production of hay and pasture has now become residential, and this trend is expected to continue. This area is adjacent to the business district of Lancaster and lies within the path of urban expansion. It has public water supply, is within the proposed sewerage district, and is adjacent to major transportation and utility networks.

Soils throughout most of the town are subject to limitations for urban development. About 90 percent of the soils exhibit stoniness, wetness, hardpan, shallow bedrock and excessive slopes, or are subject to flooding<sup>1/</sup>. More than half of the town's population lives within a compact village, partly as a result of these natural restrictions. The town plan for Lancaster recommends the accommodation of new growth within the existing service area of the village as the most economical form of new development. Scattered and haphazard growth would make provision of essential town services costly, if not impossible. Compact, well-planned growth would improve the town's chances of preserving the natural qualities of the community<sup>2/</sup>.

In April of 1973, the Town of Lancaster received approval to participate in the National Flood Insurance Program. This approval includes the flood prone areas within the town including Indian Brook. The Town is now in the process of formulating its regulations as required by that program and to minimize future damages from development in flood prone areas.

The Soil Conservation Service will assist the Town in implementing this action as described in the land treatment phase of "Planned Project".

Projections of population and the Lancaster, New Hampshire town plan for 1990 indicate the need for 50 acres for urban expansion within the watershed. The town plan shows that this need can best be met within cost and environmental constraints by development of woodland, hayland and idle land now interspersed within the urban area. It is estimated that 30 acres of hayland and 3 acres of forest land interspersed within the urban area and above the 100-year flood plain of Indian Brook will be committed to urban use. It is expected that with protection of the existing residences and properties in the flood plain of Indian Brook, another 17 acres of forest and hay land which is interspersed within the present urban area would be committed to urban development.

Forest production is relatively low. Most of the forest land is owned in small parcels with little emphasis placed on forest production. Evidence of old logging roads exists, but at present access is limited for logging operations. There is also little emphasis placed on recreation and wildlife habitat opportunities. The hydrologic cover condition of the forest land is generally good.

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<sup>1/</sup> U. S. Department of Agriculture, Soil Conservation Service, *General Interpretive Soils Report of the Town of Lancaster, Coos County, New Hampshire*, February 1970.

<sup>2/</sup> William Dickson Associates, Inc., *Lancaster, New Hampshire Town Plan*, 1970, p. 101-2.

The use of the open land is permanent hayland with generally good hydrologic cover.

The Coos County Conservation District has an active resource conservation program. Within the watershed two of the four cooperators with the District have basic conservation plans for their units. This cooperators represent 17 percent of the watershed acreage and have applied about 10 percent of the conservation practices planned for their units.

Adequate forest fire protection is provided by the New Hampshire Division of Resources Development in cooperation with the U. S. Forest Service under the Clarke-McNary Cooperative Forest Fire Control Program. Other current Federal-State forestry programs active within the watershed include Cooperative Forest Management, Cooperative Forestation, and Cooperative Forest Pest Management. Given protection, care and management, the forest stands are expected to increase their contribution to the economy of the watershed.



## WATER AND RELATED LAND RESOURCE PROBLEMS

### Land and Water Management

The Coos County Conservation District has an on-going land treatment program in Indian Brook watershed. The principal problems arise from the lack of adequate financial and technical assistance to plan and apply the needed land treatment measures.

Erosion and water management problems from changed land use continue to develop in the watershed. Urban use creates higher runoff from the watershed, increasing the erosion and sedimentation rates. Planning boards and community leaders need planning assistance to promote development in an orderly manner while maintaining environmental quality. Accelerated erosion, which might result from development must be contained by treatment measures such as plantings in critical areas, sediment trapping areas, debris basins and forest buffer zones. Currently erosion is not a problem on agricultural and forest lands.

The woodlands in the watershed are in small individual holdings. Planning for sustained yields and improved growth and quality is difficult and typically neglected on these holdings in favor of short term gains. Profits are generally small and best use of these resources is not often realized. As small holdings make up 25 percent of the total commercial timberland in Coos County, their proper management is important to the future of the county's forest-based industry<sup>1/</sup>. As the timber matures on the forest land within the watershed, access to the area will be necessary for harvest operations. To minimize erosion there is a need for proper layout and installation of skid trails and access roads.

Land treatment measures such as pastureland and hayland management and planting, drainage mains and laterals, and grassed waterways are needed on the cropland to sustain and improve production.

Recreation practices such as roads and trails are needed for access to the forest land. Wildlife improvement practices are needed to improve wildlife habitat. Technical assistance is needed to help the land-owners institute measures such as wildlife habitat management, wildlife wetland management, recreation area improvement, and recreation trails and walkways.

### Floodwater Damage

The major water resources problem in the watershed is urban flooding in Lancaster. Damages occur frequently to buildings, houses and grounds in the flood plain both from overland flooding and seepage from the high water table. Damages also occur to roads as a result of bank erosion and overtopping and washing out of culverts. Agricultural damages, limited primarily to hayland, are delayed harvest, loss of fertilizer and deposition of silt and debris on hayland and harvestable hay.

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<sup>1/</sup> New Hampshire Department of Resources and Economic Development, *Coos County, New Hampshire, Comprehensive Plan, Phase I, 1965*, p.IV-5,IV-19.

The threat of flooding exists every spring when rapid snowmelt is accompanied by spring rains and in any season when rainfall is excessive. As a result, flooding has occurred in 14 of the last 46 years and most recently in 1967, 1972 and 1973.

The problem of high flows is compounded by low channel capacity, inadequate bridge openings and a broad, flat flood plain. High flows quickly overtop streambanks and spread over the flood plain. However, water damage is not limited to periods of overland flow. Increased stages in Indian Brook raise the level of the water table, resulting in increased basement flooding from seepage.

The severity of flooding varies with the magnitude and frequency of each storm. For the 100-year frequency storm, flooding from Indian Brook affects about 50 acres of flood plain which includes 5 acres of hayland, about 14 residences and 16 mobile homes (see figure 3, page 13). The depth of flooding in the urban area from the 100-year storm is 3 to 4 feet. Flood stages at Summer Street are 1 foot over the road surface and more than 2 feet over the culvert opening. At Depot Street, stages are about 2 feet over the top of the road and more than 3 feet over the top of the culvert opening.

Flood damages are minimal for the annual storm but increase rapidly for the 5 to 10-year and less frequent storms. For the 100-year frequency storm, damages in excess of \$110,000 can be expected. The average annual flood damage is \$11,130 of which \$10,700 or 96.1 percent is to urban property, \$400, or 3.6 percent, to roads and bridges, and \$30, or 0.3 percent, to agricultural lands. Indirect damages are estimated to be \$1,700. (See figure 3, page 13, for the location of the flood plain damage area.)

While the 5 acres of hayland now in the flood-prone area is limited in use because of the flood hazard, this land is valued at several hundred dollars per acre because of its proximity to developed land. Typical house values in Lancaster are in the \$16,000 to \$20,000 range for older three- or four-bedroom homes. However, many of the homes in the flood plain reflect substandard conditions and have less value. Many of the residences in the flood plain are mobile homes which are valued from \$6,000 to \$8,000 each.

Floodwater damages were determined for three elevation reaches: the Sand Road-Causeway Street area, the area between the Boston and Maine Railroad and Summer Street, and the mobile home park located between Depot and Summer Streets. Additional damages occur to residences and three commercial establishments in downstream reaches which are on a flood plain common with the Connecticut River. Since most of the flooding in this area originates from the river, these reaches were not included in the study. Agricultural damages also occur in this common flood plain.

The mobile homes and residences in the flood plain have individual septic systems which are subject to flooding. These septic systems become inoperative during periods of overland flooding and high water table. Water pollution and health problems result.



## Erosion and Sediment Damage

There are no critical erosion areas which create a sediment problem. The most serious erosion problem occurs in the Lancaster urban area along roads in residential areas. Some erosion takes place when floodwaters overtop the roads. When this occurs, the road berms must be repaired. Eight to 24 tons of gravel are needed every 3 to 5 years to make these repairs.

The annual soil loss rate from sheet erosion is estimated at 0.25 ton per acre for the woodland, hayland and pasture areas of the watershed. This soil loss rate approaches the minimum attainable. An annual rate of 2 tons per acre is estimated for the urban area, and it is associated mainly with roads and new development. Based on the above rates of erosion and a 30-percent delivery rate for forest land and pasture and hay land and 50-percent delivery rate for urban land, the estimated sediment load delivered to the mouth of Indian Brook is 158 tons per year or 0.11 ton per acre per year. The average concentration of sediment in the water over a one year period is about 50 ppm.

Sediment damage is generally so slight that it is not measurable. The primary damage results when debris, gathered by floodwater as it flows across the flat peat and muck soils in the upper watershed, is deposited in the lower developed areas.

## Recreation Problems

Within the entire region, problems associated with recreation are similar to those associated with fish and wildlife. These are discussed in the Plant and Animal Resource Problems section. The recreation resources of the area are plentiful, attractive and in use. With the construction of two interstate highways, I-93 and I-91, the region has become more accessible to urban population centers. The natural resources are under increasing pressure because of their attractiveness, a trend which is expected to continue.

The recreation industry is an important part of the region's economy, and there is a need to protect recreation resources through proper planning of water and related land resource uses.

## Plant and Animal Resource Problems

The Indian Brook watershed is located in a region rich in fish and wildlife species and habitat. These resources are of extreme importance since they are one of the major tourist attractions. The area is strongly dependent on tourism for its livelihood. Improved highway systems along with increases in the mobility of people and more leisure time, have created a rapidly-growing demand on fish and wildlife species and their habitat.

The U. S. Department of the Interior has compiled supply and demand figures for fishing in the northern New Hampshire portion of the Connecticut River Basin<sup>1/</sup>. The area of Indian Brook is included in this report. The resources of the area can now support 520,000 fisherman days of use. Current use in the area is 294,000 fisherman days. Future demands are expected to reach 506,000 fisherman days by 1980 and 910,000 days by 2020. Through pollution abatement and increased public access, the present resource has the potential to meet 951,000 fisherman days, This will meet all 1980 demands and the overall 2020 demand; however, in 2020 the projected demand for cold water fishing will surpass the supply by 99,000 fisherman days.

Hunting will increase in the future. Despite slight decreases in projected per capita participation rates (12 percent by 2000, according to the Outdoor Recreation Resources Review Commission Study Report 26), population increases will still increase the demand<sup>2/</sup>. With the loss of habitat to development, especially around urban areas, the remaining habitat must absorb the additional pressures.

Hunting pressure for deer in the Lancaster vicinity is heavy. Good habitat and populations of eight deer per square mile of habitat are attractions to hunters. Early snows in this northern area usually provide excellent hunting conditions. As a result, the deer take rate is 1.52 per square mile, one of the highest in the State<sup>3/</sup>. Maintenance of habitat is therefore essential if the deer herd is to be maintained in light of hunting demands.

Public access is generally available to much of the land under the current management policies of the White Mountain National Forest and the major private landholders. However, demands on land for urban needs, recreation areas, and second-home developments are growing. Since most of the land is presently available for wildlife habitat, each new demand removes a portion of the present habitat.

In addition, demands for nature study and conservation education areas have increased over the past few years. The conservation of existing habitat and development of new areas for fish and wildlife is of prime importance to the region. Acquisition of fish and wildlife habitat areas is needed to meet demands for public access to fish and wildlife resources, whether they be consumptive or nonconsumptive.

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- <sup>1/</sup> U.S. Department of the Interior, Fish and Wildlife Service, *"Appendix G, Fish and Wildlife Resources," Comprehensive Water and Related Land Resources Investigation, Connecticut River Basin.*
- <sup>2/</sup> Outdoor Recreation Resources Review Commission, *Prospective Demand For Outdoor Recreation, Study Report 26*, Washington, D.C. 1962.
- <sup>3/</sup> New Hampshire Fish and Game Department, *"Deer Kill", 1972, New Hampshire Fish and Game Department Annual Report.*

### Water Qualities Problems

Effluents from the inoperative septic tanks of individual residences pollute streams during floods and wet periods. However, the Lancaster sewage treatment facility has been expanded and collection mains extend into the area. As an increasing number of residences are served by the municipal system, pollution in the stream will decrease. The town will require any new development in the service area to tie into the sewage treatment system.

### Economic-Social Problems

The economy of the area needs stimulation. The lack of employment opportunity is reflected by high unemployment and underemployment rates. Reports by the New Hampshire Department of Employment Security indicate a 15 percent decrease in covered employment since 1955<sup>1/</sup>.

The median income for families in Coos County is \$8,137, and in Lancaster, \$7,967. This is less than the \$9,698 average for the state<sup>2/</sup>. This is further complicated by the higher prices for many consumer goods resulting from the area's remoteness from major markets.

The lack of employment opportunities in the area has resulted in an out-migration, particularly among those in the 15 to 29 and the 1 to 4 year age groups. Young adults, many with children, are leaving the area to find employment elsewhere. This has significantly changed the shape of the population pyramid.

Programs under the Public Works and Economic Development Act of 1965 and the North Country Resource Conservation and Development Project have been initiated to improve the overall economy of the region.

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<sup>1/</sup> New Hampshire Department of Resources and Economic Development, *Coos County, New Hampshire Comprehensive Plan, Phase I*, 1965, p. VIII-26.

<sup>2/</sup> U. S. Department of Commerce, Bureau of the Census, *General Social and Economic Characteristics, New Hampshire*, April 1972, pp. 31-90 and 31-91.



#### RELATIONSHIP TO LAND USE PLANS, POLICIES AND CONTROLS

The Town of Lancaster has been active in developing a flood management plan for the town. Two programs involve the Indian Brook watershed.

The Town has requested and received a flood hazard analysis for the Connecticut River flood plain and its tributaries including Indian Brook. This study, carried out through the New Hampshire Office of Comprehensive Planning with technical assistance provided by the Soil Conservation Service, will provide the technical information needed to implement a plan for flood plain use and management.

In April of 1973, the Town of Lancaster was accepted as a participant in the regular program of the HUD National Flood Insurance Program. Flood plain residences and businesses are therefore eligible for flood insurance. The Town is now in the process of formulating its regulations as required by that program to minimize future damages from development in flood prone areas.

Together these programs will complement the flood prevention works of this plan in the Town's efforts toward sound and sensible flood management.



## ENVIRONMENTAL IMPACTS

### Conservation Land Treatment

Land treatment measures will maintain and improve the vegetative cover of the watershed on forest land, pasture and hay land, and in the urban area of Lancaster. The hydrologic condition of the watershed will be improved, and the peak runoff will be reduced by about 5 percent.

Forest land treatment measures including proper harvest cutting and control of erosion from logging roads will maintain forest productivity and good hydrologic conditions. Proper location of new access roads and skid trails will minimize erosion during future harvesting. Planting, management and drainage measures will be applied to 15 acres of pasture and hay land to maintain productivity and provide vegetative cover. The present erosion rate of 0.25 ton of soil per acre per year is not expected to change. This rate is well below the acceptable limits for the cover and use of lands in the watershed.

In general, the planned measures will allow increased pasture and hay land and forest land production without causing excessive soil erosion or the destruction of recreation and wildlife potential in the watershed.

Planning assistance will help encourage land use changes consistent with the maintenance of environmental quality. Application of land treatment measures will prevent annual erosion rates from exceeding acceptable limits established for the area.

Recreation trails and walkways will improve access to the forest land. In total, about 250 acres of wetland and upland game habitat will be managed to maintain and improve wildlife in the area.

Timber harvesting techniques and construction of access roads associated with logging operations will further enhance wildlife habitat and create additional recreation opportunities.

### Structural Measures

The structural measures, in combination, will reduce flooding in the urban flood plain. Channel work will increase the capacity of Indian Brook in the Summer Street area from 30 to 165 cubic feet per second. This increase in channel capacity, along with the retardation of flood flows by structures 1 and 2, will eliminate flooding on about 30 acres of flood plain area from storms up to and including the 100-year frequency storm (1 percent chance of occurrence). The protected flood plain includes the urban development in the Causeway Street, Sand Road, Summer Street and Depot Street area. In addition, forest land and hayland interspersed with and adjacent to the urban area near Causeway Street and Sand Road will be protected.

Geologic conditions in the flood plain indicate that ground water levels will be affected in the reach of channel work after construction. Along the present channel, the ground water level was found to be the same as the water level in the channel indicating a close relationship between the two. With the construction of the channel and grade stabilization structure, the channel bottom through the urban area will be about 4 feet lower than at present. As a result, during low flows the ground water levels adjacent to the channel will be lowered a like amount. Estimates of drawdown effects indicate that drier basements will result at 30 residences within 500 feet of the channel, most significantly during low-flow conditions. Lowering the water table may affect the type of vegetation in the open areas. It may allow hardwood species and grasses to prevail rather than willows and sedges.

The project provides no protection for the area downstream from the channel work but neither will it create any induced damages downstream.

This reach is a brushy, deeply-entrenched arm of the Connecticut River flood plain. The floodwaters of the Connecticut cover this stream reach nearly every spring and negate any possible benefits from the Indian Brook project. The area above the grade stabilization structure is not protected from the 100-year storm by the reservoirs and will continue to be swampy with an undefined channel in some places. In the urban area, flooding will still occur from events which result in higher flows or stages than those associated with the 100-year storm.

Without the project, the discharge between the railroad and Summer Street in the event of a 500-year frequency flood would be about 150 cfs, producing a maximum flooding depth of 4.4 feet on the flood plain. With the project installed, the 500-year frequency flood would produce a discharge of 290 cfs with a maximum flooding depth of 2.6 feet.

Upon completion, the project will protect about 30 of the 50 acres subject to flooding from the 100-year storm. This includes about 13 acres of residential land and 17 acres of forest and hay land which is interspersed within present development. The recommended measures will benefit this urban area by reducing flood stages, which at times reach a depth of 3 to 4 feet along Indian Brook. Four farmers and 30 residential property owners will benefit from the flood protection. This will also increase the value of the 17 acres of forest and hay land. Present development patterns and pressures suggest that the land located in the Sand Road-Causeway Street area may be developed. Use of this area located near town water, sewer service, transportation and utilities will eliminate the expense and disruption of extending these utilities and services into other areas.

The additional development in this area of town will increase the demand on the public water supply and wastewater treatment facilities in the area. This will not overtax either system. Transmission and collection mains have just been extended into the area and carry excess capacity to meet expansion possibilities. The additional development could result



in 140 persons to be served or loads of about .014 mgd on each system (based on 100 gallons per capita per day). According to the *New Hampshire Public Water Supply Study, Phase One Report*, the capacity of the Lancaster water supply system should be adequate until the year 2000. The sewerage treatment system is designed to handle 4,000 persons and is presently serving about 2,000.

The remaining 20 acres lies either above the proposed channel work or in the area of influence of the Connecticut River flood plain and will receive a lesser degree of protection.

The erosion problems associated with floods below the 100-year frequency magnitude will be eliminated for homes, gardens, driveways and road shoulders in the urban area. Likewise, deposition of sediment and debris in the area will be eliminated.

The project will enlarge the marsh at site 1 from 22 to 52 acres. Site 1 contains 116 acre-feet of water with an average depth of 2 feet. This marsh will be a Type 4 - inland deep fresh marsh. It will also exhibit characteristics of Type 3 - inland shallow fresh marshes, Type 5 - inland open fresh water marshes, and Type 6 - shrub swamps, which now exist. The area will be surrounded by a 7-acre buffer zone to ensure its protection and provide public access.

The fish and wildlife marsh and the buffer zone at site 1 comprise about 140 acres which will enhance the fish and wildlife habitat and population of the area. The New Hampshire Fish and Game Department will manage fish and wildlife maintenance, protection and propagation. The area will also provide a resting place for migratory waterfowl.

With a public access road provided to the marsh development, the resources of the watershed will become more available to the public. Parking facilities and a boat ramp will also be made available. Additional people and vehicular traffic will result. There is access to the area at present by way of an old logging railroad right-of-way. This is especially convenient and popular for snowmobilers in the winter. It is expected that 75 hunter days and 75 to 100 fisherman days will result from the project annually. Additional use is expected from the many persons who enjoy observing and photographing marsh wildlife.

Three beaver flowage areas and about 3,600 feet of stream channel will be flooded by the newly created marsh. At present, 3,000 feet is intermittently inundated by about 22 acres of beaver flowage. With the project, 30 acres of forest land, primarily in fir and spruce, will be flooded and become part of the marsh habitat. The trees in this area are expected to die, but will remain as a part of the marsh wildlife cover for about 10 years. The impact on the forest resources will be negligible. The loss of this 30 acres of upland game habitat will affect mostly snowshoe hare. As their range varies from 3 to 30 acres per hare, at normal population levels, habitat for about five or six animals would be lost. Water levels at site 1 will not interfere with deer yarding in the area. The deeryard is located above elevation 980, the level of design high water. The permanent fish and wildlife pool

is at elevation 976. Management of the buffer zone around the marsh development by the New Hampshire Fish and Game Department will ensure the future protection of the deeryard. The Department can regulate the water level with stop logs for purposes of fish and wildlife management.

The floodwater retarding structure at site 2 will not change existing land use patterns or vegetative cover except for about 7 acres in the construction area of the dam. This structure will not change the pool level that has been created by the beaver flowage. As in the case of the upstream reservoir site, beaver activity in the area is intermittent and at present the beaver dam is abandoned.

At site 2 potential exists for recreation and fish and wildlife use under present conditions. This includes a minor amount of hunting and nature observation. This potential will not be materially changed by the installation of the structure. In planning the project the principals concluded that the potential for recreation and fish and wildlife use did not justify acquisition of land rights in fee title for public access to the site, nor the expense of monitoring to preclude development of unsanitary conditions and impairment of water quality. For these reasons, public access will not be available to site 2.

The impoundments will affect water temperature just as the existing beaver ponds do<sup>1/</sup>. Water temperatures may increase in the summer months. Below both sites the stream flows through dense woods and cools rapidly. Neither impoundment is expected to stratify as both are less than 7 feet deep.

The proposed sites will flood over present marshy areas which contain an accumulation of partially decomposed organic material. Water quality problems may occur from flooding these marshes. The water over these organic soils may be subject to decreases in dissolved oxygen, pH and alkalinity and increases in color, nutrients and dissolved mineral matter. If water quality problems do occur, remedial measures will be taken. The reservoir level will be adjusted to reduce adverse impacts. With time, the organic situation will correct itself.

Eutrophication in the proposed impoundments will occur. There are no man-induced sources of nutrients, but an abundance of nutrients may be expected from the marshy environment. Water level management will help to reduce the concentration of any nutrients in the impoundment.

<sup>1/</sup> Rupp, Robert S. 1954. "Beaver-trout relationship in the headwaters of Sunhaze Stream, Maine". Volume 84, *Transactions of the American Fisheries Society*, 1955, pp 75-85

Changes in evaporation and seepage losses at the sites will be minimal with the installation of the project. Evaporation losses from the existing marshes at sites 1 and 2 will not change. The additional water surface created at site 1 with the enlargement of the existing marsh to the 52-acre impoundment will replace the cover of fir-spruce forest on about 30 acres. Staff members of the Northeast Forest Experiment Station estimate that the rate of evapotranspiration for a fir-spruce forest is about 20 to 22 inches per year. This is consistent with evapotranspiration rates for marshes similar to those at sites 1 and 2. Seepage losses at the dams would also be minimal. Both dams will be placed on and tied into tight, relatively impervious glacial till and rock foundations.

The dam and spillway area at both sites will create about 4 acres of open areas. An additional 13 acres will also be cleared and disrupted during construction to allow the work to be done. These cleared areas will be seeded with grasses and legumes and will provide food and cover for wildlife from spring through fall.

The channel work will modify about 3,000 feet of Indian Brook in the urban area of Lancaster. The major effect will be the enlargement of the existing channel of which 2,450 feet is natural and 550 feet is already modified. The existing channel averages 5 to 10 feet wide and 2 to 3 feet deep. The project will create a comparatively large trapezoidal channel averaging 24 to 27 feet wide and 6 to 7 feet deep. Significant effects on the fishery are not expected since the New Hampshire Fish and Game Department does not consider the affected reach of Indian Brook to be a valuable fishery.

Existing fish life and the related food chain will be disturbed in the 3,000-foot reach of channel which will be excavated. Observations, made by biologists of the Vermont Fish and Game Department on channels in Vermont which are similar to Indian Brook, indicate that the food chain will be reestablished about a year after excavation<sup>1/</sup>. Sediment produced by construction work on the channel and dams will move downstream through the reach of natural stream which outlets into the Connecticut River.

The two reservoir structures at sites 1 and 2 are designed to store 4.0 and 1.5 acre-feet of sediment respectively during the 100-year life of the project. This is sediment that would otherwise move downstream and impair water quality.

Erosion rates have been established at 2 tons per acre per year for the urban area and 0.25 ton per acre per year for forest land, and pasture and hay land. Under present conditions in the watershed, the annual sediment yield at the mouth of Indian Brook, based on a 30-percent delivery rate for forest land, and pasture and hay land, and a 50-percent rate for the urban area, is 158 tons or 0.11 ton per acre. During construction, the maximum annual yield will increase to 1,244 tons or 0.88

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<sup>1/</sup> Vermont Fish and Game Department, comments made at Act 250 hearing for Upper Castleton Watershed Project.

ton per acre. After the 2-year construction period and the reestablishment of vegetative cover, the sediment yield including a projected increase in the urban area, will decrease to 155 tons or 0.11 ton per acre. The average concentration of sediment, which is 50 ppm at present, will increase to an annual average of 380 ppm during construction. The sediment concentrations will revert to present levels after completion of the construction phase of the project.

The installation of 66-inch culverts under the three streets will interrupt vehicular traffic for about 1 day at each crossing. Rerouting of traffic will be necessary, adding about one-fourth mile travel distance to users of the roads. The culverts under the railroad tracks will be installed in cooperation with the railroad companies involved.

Installation of the project will create little or no change in the various ecological systems which exist in the watershed. No rare or endangered species would be affected by the project.

The installation of the structural measures of the project will require the commitment of about 177 acres of land resources in the watershed. The land will be transferred from private to public ownership.

After completion of the project, the channel work through the urban area will occupy 2 acres; the existing channel occupies one-half acre. The work is expected to occupy about 7 acres of land in excavation and spoil spreading. The 9,100 cubic yards of excavated material taken from the channel will be spread on the bank of the brook. The land, presently covered by grasses and shrubs, will be revegetated with similar plants after construction is completed.

Installation of the two reservoirs and the fish and wildlife facilities will require about 170 acres of marsh and forest land.

Generally, the area which is now marsh will remain marsh and the majority of forest land will remain intact except that about 30 acres will be converted to marshland and committed to this use for the 100-year design life of the project. Wildlife habitat improvement and increased public use can be expected from the development and operation of the fish and wildlife marsh.

There will be temporary noise, water and air pollution and accelerated erosion as a result of the construction activity. Construction activities are planned over a 2-year period. Land treatment measures will be completed within a 5-year period.

Upon completion of the project, public use of the watershed will increase. Public access will allow vehicular traffic to the wildlife area, previously open only to loggers, snowmobilers and hikers. An increase in litter may result. However, with the type of facilities provided the major use of the area will be by hunters, fishermen and nature observers.

### Archeological and Historical

The proposed access road will follow the old railroad bed and trail to sites 1 and 2. Construction of the single lane gravel road will disrupt the character of the railroad bed. With the placement of the access road into public ownership and regular maintenance, the location of the bed will be preserved. Public awareness of the Kilkenny Railroad will increase by posting appropriate signs and additional public use.

Approximately 400 feet of the railroad bed and trail will be displaced by construction at site 2 and about 1,600 feet flooded by the pool at site 1. The access road and a connecting trail will reestablish and insure continuity of the present trail.

Along the reach of channel work the new culverts will require the removal of the granite split stone culvert under the spur railroad track.

The project will have no effect on the site of the suspected American Indian settlement at the mouth of the Brook near the Connecticut River.

Provisions of the Preservation of Historical and Archeological Data Act (PL 93 291) will be followed. Should any valuable archeological artifact be uncovered during construction, the Secretary of the Department of the Interior will be notified and an appropriate salvage program initiated. In compliance with the National Historic Preservation Act of 1966 (PL 89 665), the National Register of Historic Places, as published in the Federal Register, was consulted and no listed place will be disturbed or involved in installing the proposed works of improvement.

### Economic and Social

The project will contribute to the economy of the area by increasing labor needs during the construction period. Based on experience with similar projects, the project should provide about \$56,000 in wages to the unemployed and underemployed of the area during this period. Thereafter, the project will contribute an additional \$950 annually through operation and maintenance funds. These factors will contribute toward meeting the objective of the Public Works and Economic Development Act of 1965.

The flood protection provided to the urban area will increase the value and development potential of this land. This will encourage development in a planned manner, increase the tax base and encourage more permanent improvements to an area which has existed under the threat of high water and floods. As this development occurs, technical assistance will be made available to the community to encourage the use of proper construction techniques to reduce erosion and sedimentation problems.

Public ownership of the wetland area at site 1 will protect this area from development. This will provide habitat for the fish and wildlife resources for which the region is noted. This is one step in protecting the overall environmental picture, upon which the tourism-based economy depends so heavily.



## FAVORABLE ENVIRONMENTAL EFFECTS

Land treatment measures applied during the installation period will improve hydrologic conditions in the watershed and thus reduce peak flows by 5 percent in the watershed.

Forest, pasture and hay land productivity will be maintained or improved.

Recreation and wildlife measures planned and installed under the land treatment program will maintain and improve wildlife habitat.

Technical assistance will encourage planned urban development.

Structural measures will reduce flooding in the urban area of Lancaster from storms up to and including the 100-year frequency storm. Four farms and 30 residences will benefit from flood protection.

Thirty of the 50 acres subjected to flooding in the lower reaches of the watershed will be protected from the 100-year storm.

Lowering of the ground water table will provide for dryer basements.

With the project, stages for the 500-year frequency storm will be 1.8 feet less at Summer Street than without the project.

Land in and adjacent to the urban area and near town sewerage and water will be available for development.

Erosion and resulting sedimentation from road berms will be eliminated for floods of less than 100-year magnitude. Deposition of debris will also be eliminated.

The project provides for a 140 acre fish and wildlife area at site 1 including a 52-acre marsh which will be managed for fish and wildlife maintenance, protection and propagation.

Access and facilities will be available for the public at the fish and wildlife development at site 1.

An estimated annual increase of 75 hunter days and 75 to 100 fisherman days will result from the project.

The dam and spillways plus the additional construction areas at each site will be seeded with grasses and legumes and from spring through fall will provide 17 acres of open areas for wildlife food and cover. The banks and spoil areas along the newly constructed channel will be planted with grasses, shrubs and tree seedlings.

The two reservoirs will collect a combined total of 5.5 acre-feet of sediment over the 100-year project life, improving water quality.

Public ownership of the access road will place the route of the Kilkenny Railroad bed into public trust. Appropriate signing will bring existence of the railroad to the attention of the public.

After project installation has been completed and land use changes, including projected urban use, have taken place, the annual sediment yield at the mouth of Indian Brook will remain constant or slightly reduced from the present yield of 158 tons, or 0.11 ton per acre, to 155 tons, or 0.11 ton per acre. The average concentration of sediment will be about 50 ppm.

Construction, operation and maintenance of this project will provide employment opportunities for local unemployed and underemployed persons. An estimated \$56,000 of the construction costs and \$950 of the annual operation and maintenance cost will be paid for this local labor.

The project will help to protect the noted environment of the region, a major attraction for visitors to New Hampshire each year.



#### ADVERSE ENVIRONMENTAL EFFECTS

About 3,600 feet of stream, of which 3,000 feet is now intermittently flooded by three beaver dams, will be permanently flooded by the proposed pool at site 1.

Thirty acres of fir and spruce forest land will be lost as upland wildlife habitat when the land is flooded by the marsh at site 1.

The 3,000 feet of channel work in the urban area will disturb the fish life and related food chain during construction and for about a year following completion of the project.

Construction activity in replacing culverts under three streets will disrupt traffic for about a day at each crossing.

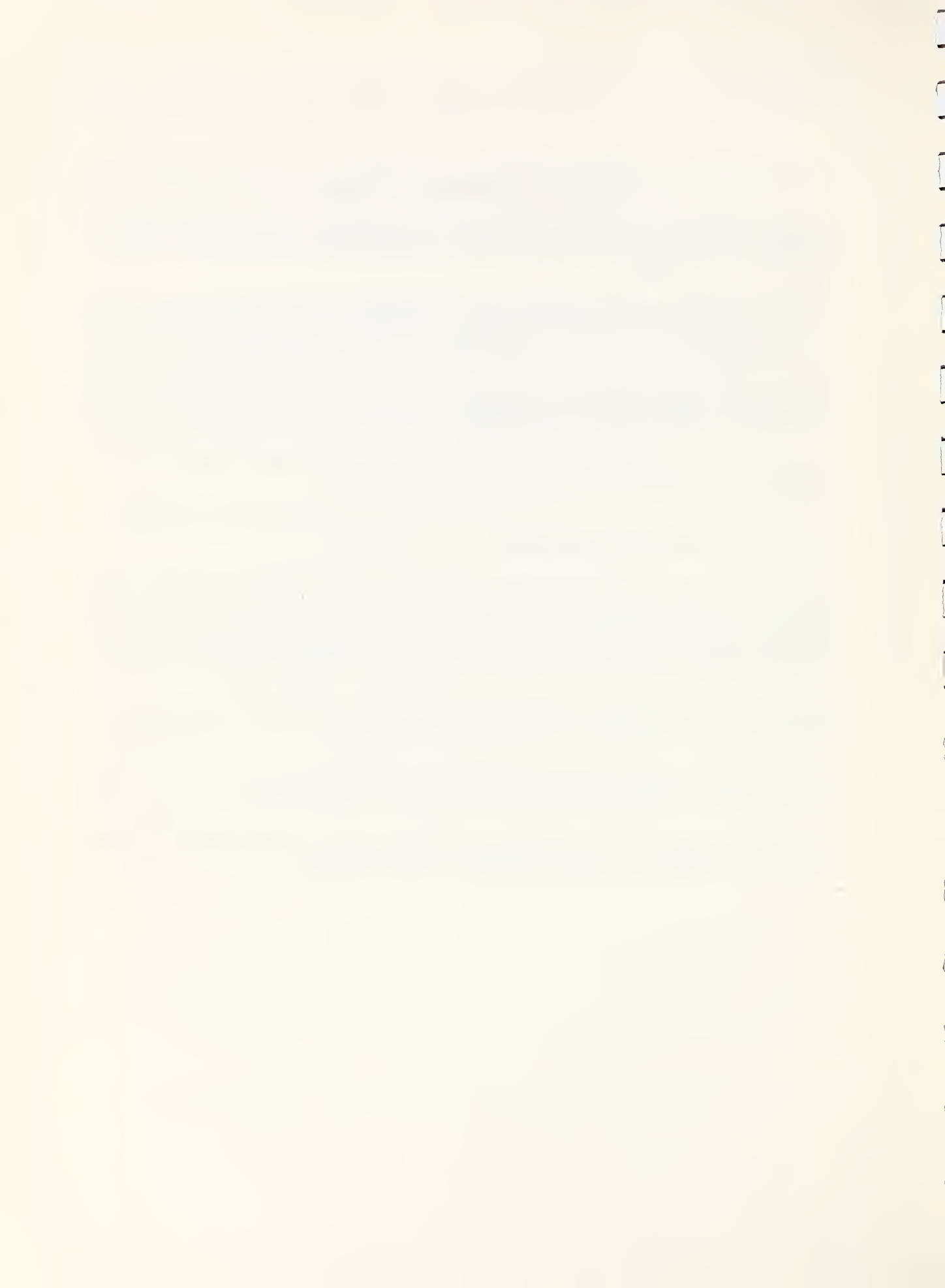
The installation of the structural measures will require the commitment of 177 acres to the project.

During the 2 year construction period the annual sediment yield at the mouth of Indian Brook will increase to 1,244 tons or 0.88 ton per acre from the present yield of 158 tons or 0.11 ton per acre. The average concentration of sediment of about 50 ppm at present will increase to 380 ppm during construction, then return to present levels.

Temporary noise, water and air pollution and accelerated erosion will take place as a result of construction activity.

Public access to the fish and wildlife development at site 1 will mean more people, litter and vehicular traffic in that area.

Construction will disrupt about 2,000 feet of the old railroad bed and cause the removal of a granite split stone culvert.



## ALTERNATIVES

### Nonstructural

Land Treatment Alone: This alternative would provide technical assistance to keep conservation and woodland management plans up to date, to develop new plans as landownership or land use changes, to maintain existing adequate cover and maintain installed land treatment measures, to plan and implement applicable treatment measures on land requiring treatment and to complete soil surveys and resource inventories. Technical assistance would also be provided to the Town of Lancaster, regional planning agencies, developers and others in planning urban development which is consistent with environmental quality.

Additional land treatment measures would be applied to treat adequately all lands of the watershed. Measures which would be applied to pasture and hay land include pasture and hay land planting and management, drainage mains and laterals, and grassed waterways on the cropland. Forest land measures which would be applied are harvest cutting, skid trails, access road location and stabilization, recreation area improvement, recreation trails and walkways, and wildlife habitat management. Measures which would be installed in the urban area include sediment trapping areas, debris basins and forest buffer zones. This alternative plan would be similar to the land treatment phase of the planned project.

The cost of the land treatment plan would be about \$80,700.

This alternative would improve the hydrologic condition of the watershed, reduce flood flows by about 5 percent and provide a limited amount of fish and wildlife and recreation opportunity. Opportunities for systematic development would be improved through the availability of technical assistance to local planning boards and community leaders to help guide planned urban development and the maintenance of environmental quality.

The plan would meet the selected objectives of the sponsors for a land treatment program. However, the plan would not provide flood protection from the 100-year frequency flood nor would it lower the water table in the urban flood plain. There would be no significant provision for the improvement and protection of fish and wildlife habitat.

If this alternative were implemented, some of the adverse environmental effects of the planned project would be avoided. These are: (1) the loss of stream reach due to flooding by the proposed pool; (2) the loss of 30 acres of forest land to the marsh; (3) disturbance of any fish life and related food chain in the reach of channel work; (4) disruption of traffic to install culverts at Summer and Depot Streets; (5) the commitment of 177 acres of land to the planned project; (6) the temporary effects of noise, water and air pollution and accelerated erosion resulting from the construction activity; and (7) people and vehicular traffic coming into the fish and wildlife development area.

Land Use Control and Flood Insurance: In April 1973, the Town of Lancaster received approval to participate in the National Flood Insurance Program, which is administered by the Department of Housing and Urban Development. In order to retain eligibility in the program, the Town must adopt flood plain zoning ordinances. The Soil Conservation Service has prepared maps delineating the flood hazard zones and provided them to the Town.

The estimated annual cost for insurance premiums would be about \$6,500, of which about \$650 would be local cost. The present worth of this cost over 100 years at 5-7/8 percent is \$110,000. An additional \$5,000 would be needed for town planning services to implement land use controls.

This alternative would reimburse participating landowners for financial loss from flood damages according to the guidelines of the insurance program.

Through the imposed land use controls, future development on the flood plain would be restricted. Existing development on the flood plain would remain essentially intact.

The insurance payments for flood damages incurred by participants in the program would provide reimbursement for property and household items damaged. However, payments would not be adequate either to replace totally items destroyed or damaged, or to provide for such related items as cleanup, inconvenience and other indirect damages. This alternative does not eliminate the 100-year flood nor does it lower the water table in the urban flood plain of Indian Brook. There would be no significant provision for improvement and protection of fish and wildlife habitat.

This alternative would avoid the same adverse environmental effects as the "Land Treatment Alone" option.

Floodproofing: This alternative would require the floodproofing of the 16 mobile homes and 14 residences that are located on the flood plain. Each residence and mobile home would be altered in such a way that property damage would not occur for the selected design flood (probably the 100-year frequency flood). In some cases, it might be necessary to raise the mobile home to an elevation above the floodline. In the case of permanent buildings, the installation of structural and other works could be needed to provide adequate protection. Any new development on the flood plain could be protected from flooding by building the structure at an elevation above the selected design flood and with sufficient structural integrity to withstand expected flows.

The cost to floodproof the buildings and mobile homes now located on Indian Brook flood plain would be about \$80,000.

Floodproofing would reduce floodwater damage by protecting existing buildings on the flood plain from floods up to and including the selected design flood.

This alternative would not eliminate the 100-year flood from the flood plain nor would it lower the water table. Damages to roads and culverts would continue. There would be no provision for fish and wildlife habitat protection and improvement.

As in the case of the "Land Use Controls and Flood Insurance" alternative, this plan would avoid the same adverse environmental factors as the "Land Treatment Alone" option.

Relocation of Existing Buildings: Thirty families would be relocated out of the flood plain. The existing residences would be moved to areas where flooding is not a problem. The 16 mobile homes could be moved easily. In the case of the 14 permanent residences, some of the houses might be moved while others would have to be replaced. New septic systems and other services would be required. Existing development on the flood plain occupies about 13 acres. The abandoned area could be used as open space and land use controls would be placed on its future use so that no new development would take place.

The cost to relocate the 30 families into nearby areas outside the flood plain would be about \$660,000. This includes the cost to move each family, the mobile homes and permanent houses that are movable, to purchase the flood plain land and the land outside the flood plain on which to relocate, and to provide the necessary services.

If such an alternative were implemented, the flood hazard associated with the flood plain would be reduced. The flood plain area would then become available for open space or some other use compatible with the flooding problem.

This alternative plan would have a social impact on 30 families by moving them from one location to another and would create a severe hardship in some cases.

The relocation of 30 residences out of the flood plain at one time would create an impact in other areas of the town. The availability of adequate residential space within the existing service areas of town facilities is unlikely. This will result in the necessity of extending the service areas into immediately surrounding areas or forcing relocations to random scattered areas; the result would be urban sprawl.

The flooding and high water table in the flood plain would still exist; however, the use of the area would have changed so that floodwater damages would not be significant. Damage to roads and culverts would continue and travel would be interrupted during periods of flooding.

As with the other alternatives given, this option would avoid the same adverse environmental effects as the "Land Treatment Alone" plan.

Land Use Controls, Floodproofing and Relocation: This alternative is a combination of the three options discussed singly above. The combination offers flexibility in comparing and selecting the single alternative which seems most practical to solve a problem of flood plain management.

The 16 homes in the mobile home park could be relocated with relative ease. The remaining 14 permanent residences would be floodproofed for a selected design flood. (In this case, a 100-year frequency flood was used for estimating cost.) Land use controls could be adopted to prevent future development.

This alternative would cost about \$214,000.

Essentially, this alternative would eliminate floodwater damages from overland flooding to those houses still remaining in the flood plain.

The basements of the homes remaining in the flood plain would be protected from the existing high water table. Land in the flood plain would become available for other, less intensive, uses.

As discussed under "Relocation of Existing Buildings", the relocation of the 16 families living in mobile homes would create hardships. Utilization of the necessary land to relocate the mobile homes would create an additional impact on the towns. Construction activities to floodproof the homes remaining in the flood plain would create brief disruptions. Flooding of the roads in the flood plain would continue to be a traffic hazard. Land use controls would restrict the use of the land in the flood plain.

This alternative would not relieve the high water table or reduce the level of flooding on the flood plain.

The adverse environmental effects of the planned project which would be avoided if this alternative were implemented would be the same as those listed under the "Land Treatment Alone" alternative.

### Structural

Fish and Wildlife Development (Single-Purpose): A single-purpose fish and wildlife development could be built at either site 1 or site 2 for enhancement, preservation and protection of fish and wildlife habitat in the area. The size of the pool at either site could vary from just a few acres to 100 acres. The dam could be built with a water level control feature to manage the habitat more effectively than the natural controls that presently exist. A small service area, including parking and a boat ramp, could provide access for public use.

A 50-acre marsh development at site 1 with facilities for public use would cost about \$98,000. A 20-acre development at site 2 for public use would cost \$90,000.

A development at either site would provide improved fish and wildlife habitat. It will also provide public access into a wildlife area that people could enjoy.

Such a project would permanently flood about 3,600 feet of stream. Up to 30 acres of fir and spruce forest land would be lost including its availability as upland game habitat. Up to about 140 acres of land would be committed to the project. There would be noise, water and air pollution and accelerated erosion during construction activity. The project would open the area to more people and vehicular traffic. Accelerated erosion during construction would contribute greater amounts of sediment downstream.

This alternative would not meet the sponsors' objective to provide a 100-year level of flood protection in the urban area nor would it reduce the water table level in the flood plain.

If this alternative were implemented, major disturbance of fish life and related food chain in the reach of the proposed channel work, and disruption of traffic to install culverts at Summer and Depot Streets would be avoided.

Channel Work Alone: This alternative involves about 3,000 feet of channel work in the urban flood plain. A grade stabilization structure would be located at the upper end of the proposed channel work to drop the streamflow from the natural stream into the constructed channel without creating an erosion problem. The channel would be about 30 feet wide and 7 feet deep and would carry the flow from a 100-year frequency flood.

The cost of channel work alone would be about \$130,000.

This alternative would meet the sponsors' objectives to provide 100-year level flood protection and lower the water table in the flood plain thus reducing flood damages to the property owners.

The 3,000 feet of channel work would disturb the fish life and related food chain during and following construction. Disruptions caused by construction activity in replacing culverts at Summer and Depot Streets would necessitate the rerouting of traffic. There would be noise, water and air pollution and accelerated erosion during construction activity. The proposed channel work would induce higher peak flows downstream.

This alternative does not include an accelerated land treatment program, the protection and improvement of existing fish and wildlife resources, a fish and wildlife marsh development or land use planning.

Some of the adverse environmental effects of the planned project which would be avoided if this alternative were implemented, would be (1) the loss of stream reach due to flooding by the proposed structure at site 1;

(2) the loss of 30 acres of forest land to the marsh; (3) the commitment of about 170 acres of land to the planned project; and (4) people and vehicular traffic coming into the fish and wildlife development area.

Floodwater Retarding Structures: In this alternative, two reservoir structures would be located at sites 1 and 2. They would be essentially the same size as those included in the planned project, and the dam and spillways at site 2 would be the same. The dam at site 1 would be about 1 foot lower without any fish and wildlife water stored in the pool.

The cost would be about \$66,000 for structure 1 and \$58,000 for structure 2, or \$124,000 for the two.

The structures would provide some flood protection to the urban flood plain, but the level would be inadequate to meet the sponsors' objectives for flood protection.

About 90 acres of land would be committed to this alternative.

There would be noise, water and air pollution and accelerated erosion during construction activities.

This plan would not include land treatment, the protection and improvement of existing fish and wildlife resources, a fish and wildlife marsh development or land use planning.

Adverse environmental effects of the planned project which could be avoided, if this alternative were implemented, would be (1) disturbance of the fish life and related food chain in the reach of proposed channel work; (2) disruption of traffic to install culverts at Summer and Depot Streets; and (3) people and vehicular traffic coming into the fish and wildlife development area.

Channel Work and a Multiple-Purpose Structure: The multiple-purpose structure would be located at site 2. A 120-acre lake would be available for recreation and fish and wildlife purposes. The lake would be deep enough to provide a cold water fishery. The channel work would be approximately 3,000 feet in length with a grade stabilization structure located at the upper end. The depth of the channel would be 6 to 7 feet and the bottom width 6 feet; the top width would range from 24 to 27 feet.

The cost to install the structural measures planned in this alternative would be \$480,000.

This alternative would provide flood protection from the 100-year storm to 30 acres in the urban flood plain, including 30 residences. The ground water table would be lowered. Recreation and fishing opportunities would be available at the lake. Land in the flood plain near town sewerage and water would be available for development. The dam and spillway would be seeded to grasses and legumes and would provide open areas of food and cover for wildlife.



About 250 acres of forest land, including game habitat to be replaced, would be taken for the proposed lake. The channel work in the urban area would disturb the fish life and related food chain during and for about a year following construction. Traffic on Summer and Depot Streets would be disrupted while culverts were replaced. About 300 acres of land would be committed to the project. Noise, water and air pollution and accelerated erosion might occur as a result of the construction activity. The area at the multiple-purpose site would be available to people and vehicular traffic.

This alternative does not include an accelerated land treatment program, the protection and improvement of existing fish and wildlife resources or land use planning.

This alternative would avert none of the adverse effects of the planned project with the exception of the commitment of some of the land around site 1.

#### No Project

If no project is considered, there would be no concerted activity directed toward solving the water and related land resource problems that exist in the watershed. The existing conditions in the watershed are discussed in the Environmental Setting section.

At present there is an on-going land treatment program in Coos County. Part of this effort is applied to the lands in the watershed. This activity could be expected to continue at its present rate. About \$6,700 is spent each year in the watershed to carry out the on-going land treatment program. This includes both the cost of installing the treatment measures and the cost of technical assistance.

If no project is considered for the watershed, the floodwater damage problems the sponsors are trying to solve would remain. Net annual monetary benefits of \$6,030 would be foregone.

The accelerated land treatment program, elimination of floodwater damages, provisions for a fish and wildlife marsh, land use planning, and protection and improvement of existing fish and wildlife resources would not be considered in an overall planning and implementation effort.

All of the adverse environmental effects of the planned project would be avoided if this alternative were selected.



## SHORT-TERM VS. LONG-TERM USE OF RESOURCES

The major land use in the watershed is forest with the remainder of the land in pasture and hay land and urban uses. There is a trend toward urban development which will probably affect the pasture and hay land in the proximity of the urban area. Most of the forest land will probably remain intact.

The project will solve the immediate flooding problems in the urban area of the watershed. With flood protection provided, additional development on the urban flood plain is likely to occur. This area is close to the business district of Lancaster, is within the present urban area and town water and sewer service area, and is adjacent to major transportation and utility networks. Development of this land will delay or eliminate the necessity of extending town services to other more remote areas. However, development of the area precludes long-term use of the area for some other purpose.

The project will result in the conversion of 30 acres of woodland to marshland at site 1. An additional 17 acres of woodland will be cleared to allow construction of the dam and appurtenances and work areas at sites 1 and 2. The existing wetland use will continue and the area will remain productive for wildlife.

There will be some disturbance of the proposed reservoir area and in the channel work reach during the construction period. These areas will stabilize in about 2 years.

The project will reduce options for long-term use of the land committed to the structural measures, which include the planned dams, spillways, ponded water, flood pools and channel.

The design life of the project is 100 years. However, through proper operation and maintenance, the project will continue to function beyond this planned life. Beyond the design life the sediment pools will lose their effectiveness as they become filled with accumulated sediment. The project will continue to provide flood protection, watershed protection and fish and wildlife habitat at a diminishing rate. An available option would be to clean the sediment pools.

The flood prevention works in this project will tie into a flood management plan effectively. For the town of Lancaster, such a plan would include flood plain zoning and the Department of Housing and Urban Development flood insurance program.

The Connecticut River Basin Comprehensive Water and Related Land Resources Investigation on use and development opportunities was completed in June, 1970. It covers the Connecticut River subregion of the New England Water Resource Region as designated by the Water Resources Council. The study identifies Indian Brook as one of 17 projects currently being planned or having potential for early action (1980) planning under PL 566. In addition, 11 projects have either been completed or are in construction in the Connecticut Basin.

From a hydrologic point of view, this project will produce no regional or cumulative effects; the watershed is too small. The flows of the Connecticut River at the confluence of Indian Brook are the results of runoff from about 1,300 square miles of drainage area, while Indian Brook adds only 2.2 square miles. The economic effects of the project will be felt primarily in the Lancaster area with lesser benefits more widespread.

## IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

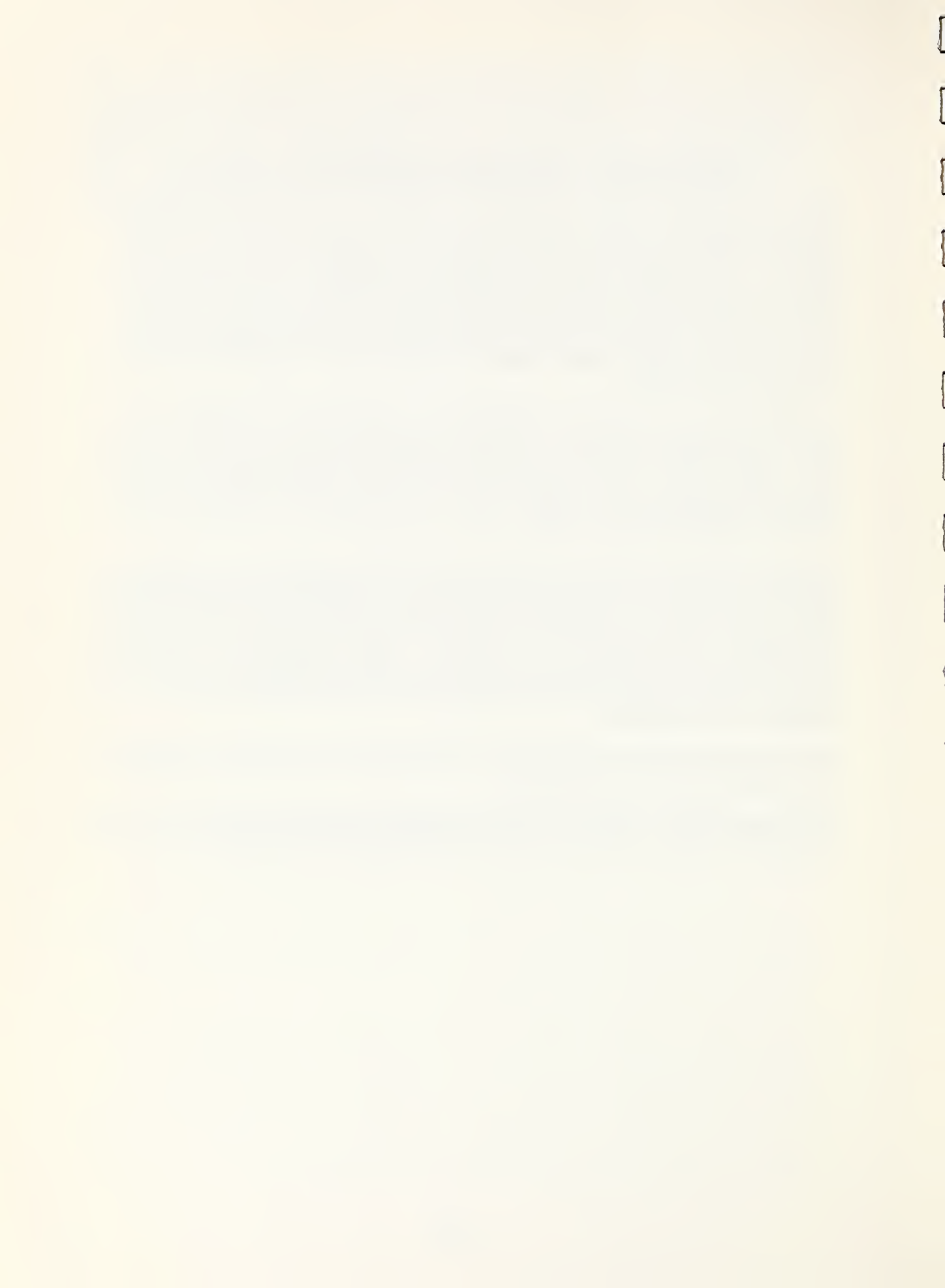
The two reservoirs and the fish and wildlife facilities will require about 170 acres of marsh and forest land. About 125 acres is forest and 45 acres is marsh. About 30 acres of forest will be converted to marsh. The 170 acres will be utilized as follows: 23 acres for the dams, appurtenances, work areas and access road; 59 acres for marsh either in the fish and wildlife development site or in the existing beaver pond at site 2; 24 acres for temporary flood storage; and 64 acres for the buffer area around the pool at site 1 and the fish and wildlife facilities.

The structure at site 1 is designed for 4 acre-feet of sediment capacity and will be filled to capacity during the 100-year design life. The 7-acre beaver flowage acts as the sediment pool at site 2. The pool, which has a total capacity of 7 acre-feet, will store the estimated 1.5 acre-feet of sediment which is estimated to accumulate during the 100-year design life.

About 7 acres of land in the urban area will be needed for channel excavation, spoil spreading, and access for operation and maintenance. Some of this land is presently being used as lawns by residents along the stream. The remainder is in hayland and forest land. Perpetual easements on this land will be secured. After construction, the area will be planted with grasses, shrubs and tree seedlings. The area occupied by the channel will be increased by about  $1\frac{1}{2}$  acres as a result of the project.

These land and water areas will be committed for at least as long as the planned life of the project.

Other commitments which are not retrievable are the labor and materials expended to plan, install, operate and maintain the project.



## CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

In June, 1966, the sponsors of Indian Brook watershed applied for assistance in planning and implementing works of improvement under the Watershed Protection and Flood Prevention Act. In July, 1966, the State Soil Conservation Committee, acting for the Governor, approved the application. Planning was authorized on June 7, 1967.

Since that time several field trips and planning meetings have been held. State and federal agencies were notified that planning had been authorized and were invited to participate in the planning process. Federal agencies notified were: the Office of Economic Opportunity, the National Weather Service, the Farmers Home Administration, U. S. Fish and Wildlife Service, the Bureau of Outdoor Recreation, the Agricultural Stabilization and Conservation Service, the Bureau of Mines, the Bureau of Public Roads, the Environmental Protection Agency, the U. S. Geological Survey, and the Department of the Army.

State agencies notified were: the Division of Resources Development, the Department of Agriculture, the Office of Comprehensive Planning, the Water Supply and Pollution Control Commission, the Agricultural Stabilization and Conservation Committee, the Department of Fish and Game, the Agricultural Research Station, the Department of Public Works and Highways, the Division of Parks, the Soil Conservation Committee, and the Department of Resources and Economic Development.

The National Register of Historic Places and other literature has been reviewed. Consultation has been made with the New Hampshire State Historic Preservation Officer, Lancaster Historical Society, Lancaster Conservation Commission, Lancaster Planning Board and other local interested citizens. In addition on-site field surveys were conducted by professionals for archeological, historical and architectural values. The project actions involving the culvert and the railroad bed are based on recommendations by the preservation officer and historical consultant.

The U. S. Fish and Wildlife Service prepared a reconnaissance report, later revising it, to reflect multiple-use planning changes. The New Hampshire Fish and Game Department was kept up-to-date on the planning through a series of semiannual meetings held by the Soil Conservation Service, the Fish and Game Department, and the U. S. Fish and Wildlife Service.

In 1969, the sponsors formulated a plan which included a recreation development at the proposed site. The local newspaper printed articles explaining the project. In February 1970, the sponsors presented the plan to the public at the Town of Lancaster annual budget hearing. Later, in June 1970, the plan was again presented to the public. The proposed recreation plan was discussed in greater detail at this meeting. Following the June meeting, the sponsors decided to abandon the recreational proposal.

At a regular semi-annual meeting of the Soil Conservation Service, the Fish and Game Department and the U. S. Fish and Wildlife Service on January 15, 1971, the Fish and Game Department stated that it wished to participate in a fish and wildlife development plan for the Indian Brook watershed. The Department became a sponsor and the work plan

was revised changing from recreation development to fish and wildlife habitat development. The plan was then presented to the sponsors and approved at a meeting on July 26, 1971. The U. S. Forest Service and the U. S. Fish and Wildlife Service were present at this meeting.

In May 1974 a draft work plan and a preliminary draft environmental statement were distributed to state and federal agencies and private conservation groups for review and comments. During the afternoon of June 3, 1974 an informal field review for federal and state agencies was held in Lancaster to review the proposed plan. A tour of the watershed followed.

The New Hampshire Water Resources Board made public notice two weeks in advance that the Board would conduct a public hearing at 7:30 p.m., June 3, 1974 in the Lancaster Town Hall. The purpose of the meeting was to inform the public of the proposed project and to receive questions and comments. The public information meeting was held as scheduled and the project was explained to the public.

The following agencies and groups were requested to comment on the draft environmental statement and they responded as follows:

Department of the Army	No Response
Department of Commerce	Responded
Department of Health, Education and Welfare	Responded
Department of the Interior	Responded
Department of Transportation	Responded
Advisory Council on Historic Preservation	Responded
Environmental Protection Agency	Responded
Federal Power Commission	No Response
Office of Equal Opportunity - USDA	No Response
New Hampshire Department of Public Works and Highways	Responded
New Hampshire Department of Resources and Economic Development	Responded
New Hampshire Office of Comprehensive Planning (State Clearinghouse)	Responded
New Hampshire State Soil Conservation Committee (designated by the Governor)	No Response
New Hampshire Water Supply and Pollution Control Commission	Responded
North Country Council, Inc. (Regional Clearinghouse)	Responded
New England River Basins Commission	No Response
Sierra Club	Responded
Appalachian Mountain Club	No Response
Audubon Society of New Hampshire	No Response
Trout Unlimited	No Response
Society for the Protection of New Hampshire Forests	No Response
New Hampshire Historical Society	No Response



Natural Resources Defense Council	No Response
Friends of the Earth	No Response
Environmental Defense Fund	No Response
National Wildlife Federation	No Response
Environmental Impact Assessment Project	No Response

Discussion of comments received during review of draft environmental statement for Indian Brook watershed is given below.

Department of Commerce:

Comment: A comparison of the costs and the benefits of the proposed program has not been summarized in the draft environmental impact statement. We recommend that the cost and benefits of the general factors associated with each plan be presented in tabular form to permit the determination of numerical ratios which justify the plan selected.

Response: The report presents project costs on pages 17 and 18 and a comparison of the costs and benefits in appendix A. In summary the annual costs are \$13,000 and the annual benefits \$19,030 yielding a benefit:cost ratio of 1.5:1.

The costs of various alternatives studied are presented in the alternatives section (pages 53 to 59). These were studied in sufficient detail to generally show the costs of various alternatives and their relative effectiveness in meeting project objectives.

Department of Health, Education and Welfare:

Comment: It appears that those impacts within the scope of this Department's review have been adequately addressed.

Response: No response necessary.

Department of the Interior:

Comment: It is the policy of the Department of the Interior to oppose channelization as a flood control measure where such work is planned for an area which has specific fish and wildlife values. However, for the proposal under consideration, we note that the State Fish and Game Agency does not place any significance on the fish and wildlife values in this 3,000-foot reach of stream. We believe the work plan and draft statement would be materially improved if there were a more detailed description of these values in this reach. Such information would clarify the position taken by the State Fish and Game Agency.

(1)

Response: A revision in the Environmental Setting section (page 25)  
(1) describes this reach of Indian Brook in terms of fish and wildlife values.

In summary, the low significance put on fish and wildlife values in this area is based on the frequently very low or non-existent stream flows and on poor water quality.

Comment: A basic impact on this project is the expansion of urban-  
(2) ization into the flood plain as a result of providing a high level of flood plain protection. We believe such actions require clarification since it appears to be inconsistent with the policy guidelines set forth in Watershed Memorandum 108, Section 5, Executive Order 11296 and the goals and objectives of HUD's flood insurance program for the Town of Lancaster which was approved in 1973.

Response: This is not inconsistent with the guidelines given in  
(2) section 5 of Watershed Memorandum 108. The purpose of the project is to protect existing development, not to encourage new development. Land use in this area will be regulated by the Town of Lancaster in a manner which is compatible with the requirements of the HUD flood insurance program. This will also fall within the direction given by Executive Order 11296.

Also see response 1 under EPA comments, page 73.

Comment: The proposed project will not adversely affect any exist-  
(3) ing or proposed unit of the National Park System or any known historic, natural, or environmental education sites eligible for the National Landmark Programs.

Response: Studies carried out for this project verify your statement.  
(3)

Comment: Subsequent to review distribution of these subject docu-  
(4) ments, the New Hampshire Historic Preservation Office, over the signature of Ms. Mary M. Jeglum, Director, on November 18, sent a negative commentary to the Soil Conservation Service. We would expect that letter to be made a part of the Final Environmental Statement.

Response: A copy of the letter is enclosed in appendix C.  
(4)

Comment: Neither the draft environmental statement nor the work plan  
(5) give adequate treatment to archeological aspects. The name of the qualified archeologist who performed the site investigation, and more of his or her findings, should be shown and discussed in the environmental statement. Correction of this deficiency can be made and shown in the Final Environmental Statement.

Response: The Soil Conservation Service contracted for and received an  
(5) assessment of archeological, architectural and historical resources in the watershed. Two items of local interest, a stone culvert and a logging railroad bed, were identified. References on archeological and historical resources are found on page 12, 29, 47, 50, 51, and 65. Also see comments from Advisory Council on Historic Preservation (pages 74 and 75.)

Comment: Environmental quality of the watershed would not be enhanced  
(6) by channelization of 3,000 feet of stream. More enhancement could be achieved by installing water level control structures at sites 1 and 2, and allow the New Hampshire Fish and Game Department to regulate water levels on a schedule most beneficial to fish and wildlife. Our suggested environmental quality plan would include water level control structures at the two sites, no channelization, flood plain management with no additional non-flood-proof development in the flood plain, and any necessary land treatment measures.

Response: The environmental quality plan described in the plan in-  
(6) cludes land treatment, 3,000 feet of channel work, land acquisition for habitat preservation and flood plain management. This plan will control erosion and sedimentation, improve the quality of urban land, and preserve and enhance wildlife habitat. The sponsors feel the channel work is a necessary part of the plan to enhance the quality of land in the residential areas of the flood plain. The wet conditions which exist there at present cannot be accepted as being a quality environment for people to live in. Your suggestion provides an alternative to other elements of the plan.

Comment: It is questionable whether or not the individual landowners  
(7) will be willing to bear the costs of land treatment measures. In view of the economic impoverishment of the area, as indicated in the median income information on page 10, it is doubtful whether landowners will be willing to institute land treatment measures that may not produce short-term gains. The same comments apply to other parts of the work plan where the land treatment measures are discussed (pages 3, 15, 35, 57, and 61).

Response: The report recognizes the problems some landowners may have  
(7) in bearing additional costs of land treatment measures. However, a good response is anticipated.

The majority of land treatment measures and expenditures are slated for forest land and involve such measures as proper harvest cutting, skid trails and access road location and stabilization and fire protection. These are necessary expenditures in any logging operation. In most cases it costs very little more, if any, to carry out these operations

using good conservation practices. When this can be demonstrated to landowners, implementation of these conservation measures are often adopted as part of their operation. In addition, there are cost sharing incentives (administered by the Agricultural Stabilization Conservation Service - ASCS) which will encourage landowners to follow good conservation practices.

The second major expenditure is planned for areas expected to undergo urban development. These areas are subject to local or state regulations which insure installation of erosion control measures.

Comment: Page 45 - paragraph 1 - Implementation of land treatment  
(8) measures to reduce peak run-off is questionable. See comments on "Summary of the Plan" above.

Response: As noted above, we expect good response to the installation  
(8) of land treatment measures. Based on analyses in this study and on past experience in other watershed projects, a 5 percent reduction in peak runoff is accepted as the net effect that can be expected from a good land treatment program. Also see response 7 and 9.

Comment: Page 45 - paragraph 4 - It is stated that application of land  
(9) treatment measures will prevent annual erosion rates from exceeding acceptable limits established for the area. Yet, on page 19, paragraph 2, it is mentioned that the estimated existing soil loss rate for wood land, hay land, the pasture approaches the minimum attainable. Page 17, paragraph 1, states that there are no critical erosion areas creating sediment problems. It seems that this problem is so minor already there is no justification for land treatment measures for this purpose.

Response: The Soil Conservation Service works on the principle that  
(9) soil, water and plant resources are interdependent and must be managed as a whole. Therefore, a basic part of a watershed plan is a land conservation program.

Under present conditions, minimum soil losses can be expected from the Indian Brook watershed. However, soil losses could increase significantly as a result of future urban development and poor timber harvesting techniques. Only if these are done properly will the soil losses remain at a minimum. Land treatment measures are needed to maintain this condition.

- Comment: (10) On page 45, paragraph 7, and on pages 37-38 of the draft environmental impact statement, it is stated, "Along the present channel, the ground water level was found to be the same as the water level in the channel indicating a close relationship between the two." It is not clear if available data would indicate that this relationship holds true for all non-flood flows. If so, a statement on the present channel depth and minimum flow conditions would allow an assessment of water-table fluctuations that occur.
- Response: (10) The Environmental Setting section gives channel depths as 2 to 3 feet and low stream flows as nearly zero. Water table fluctuations, as related to channel flows, could be as much as 3 feet under present conditions.
- Comment: (11) In the last sentence of that same paragraph (in both texts), it would be appropriate to specify that estimates indicate that drier basements and more efficient operation of septic systems would occur at 30 residences within 500 feet of the channel, and that these improvements might only be experienced during low-flow conditions.
- Response: (11) This sentence has been changed in the report for clarification. (Page 42.)
- Comment: (12) It is stated, "Analyses indicate that drawdown effects upon basements would extend up to 500 feet from the channel during dry weather, low-flow conditions." It would be more appropriate to state that analyses indicate that during low-flow periods, groundwater levels within 500 feet of the channel would be lower than they are under present conditions.
- Response: (12) We have changed the text of the plan to clarify (page 86, plan).
- Comment: (13) Potential adverse environmental impacts related to geologic conditions appear to have been given adequate consideration in the draft environmental statement and accompanying work plan. The statement appears outstanding in its comprehensive description and evaluation of the proposed watershed project. Among the noteworthy features is what appears to be a particularly accurate delineation of flood plain in the vicinity of proposed channel enlargement (Figure 3 in the environmental impact statement).
- Response: (13) The delineation of the flood plain for with and without project conditions is also included in the Flood Hazard Analysis Report for the Town of Lancaster. This information is available for the town to use in their land use plans.

Comment: Page 3 - paragraph 1 - It is stated that land treatment  
(14) measures will be installed by landowners dependent upon their individual interests, their means to do so, and applicable state and local laws. Technical assistance will be provided. In view of the economic impoverishment of the watershed area, as indicated to what extent is it likely that landowners will be willing to institute land treatment measures that may or may not bring them short-term gains. If the likelihood is small, or does not exist at all, then this project element would have to be considered irrelevant as a feasible measure.

Response: See response 7.  
(14)

Comment: Page 37 - paragraph 1 - Implementation of land treatment  
(15) measures to reduce peak run-off is questionable.

Response: See response 8.  
(15)

Comment: Page 37 - paragraph 4 - It is stated that application of  
(16) land treatment measures will prevent annual erosion rates from exceeding acceptable limits established for the area. Yet, on page 33, paragraph 2, it is mentioned that the estimated existing soil loss rate for wood land, hay land, and pasture approaches the minimum attainable. Paragraph 1 states that there are no critical erosion areas creating sediment problems. It seems that this particular problem is so miniscule already that there is no justification for implementation of land treatment measures for this purpose.

Response: See response 9.  
(16)

Department of Transportation:

Comment: The Department of Transportation has reviewed the material  
submitted. We have no comments to offer nor do we have any objection to this project.

Response: No response necessary.

Environmental Protection Agency:

Comment: One point of concern is with regard to the land use plans and  
(1) the encroachment of urban development on the flood plain area. It is our interpretation of the statement that the proposed project is to protect 30 families currently located within the flood plain of Indian Brook. However, the statement indicates that approximately 17 additional acres of flood plain will be available to urban development if the project is implemented. This flood plain encroachment appears to be in direct contrast to policies of sound land use planning. Before we could concur

with this project, plans would have to be developed excluding the possibility of any permanent dwellings in this area. We would further suggest that this 20-acre parcel of land be used for some type of recreational facility that would not be subjected to flood damage.

Response: (1) The purpose of the project is to reduce flood damages to existing development in the present flood plain, not to encourage new development. The information presented in the statement, including the possibility of additional development, describes the potential impacts of the project in the flood plain area. In the process of providing flood protection for existing development, undeveloped land which is interspersed in this urban area will also be protected from the 100-year flood and will be generally drier than at present. This is likely to have two effects. The value of the land will increase; and development is more likely to take place.

It is important to note that this land area and any development will be regulated by land use ordinances of the Town of Lancaster. Since the town is in the HUD flood insurance program and is interested in continuing this coverage, the regulations, when finalized, must meet minimum HUD requirements. The regulations should minimize or eliminate increases in flood damage potential in this area. Basically, HUD uses the 100-year flood plain to define its special flood hazard areas. After the project is implemented, the area in question will be above the 100-year flood level. To totally exclude development from this area would offer the most positive control, but would seem to be unrealistic in light of land use regulations for the remainder of the town.

The statement discusses some of the development problems in the town of Lancaster (see Environmental Setting section, pages 29 and 30). In summary a major portion of the town is subject to limitations for urban development. The town plan for Lancaster recommends the accommodation of new growth within the existing service area of the village as the most economical and environmentally sound form of development. The area in question is within this service area and has available utilities, public water supply and sewerage disposal, and transportation. Development outside this area will require the costly extension of these services and result in environmental disruption to a wider area.

The purchase of this land for use as a recreation facility would offer positive control of development. However, this would be an unnecessary expense to the town. The town presently has an excellent recreation program with adequate space provided. The program is financed by a trust fund established specifically for this purpose. The land may not be suitable for recreation or wildlife habitat. It is not a contiguous parcel but rather is many small parcels interspersed in the urban area.

Comment: A second point of the draft statement that we would like to see a more complete assessment of is the existing subsurface disposal systems. It would seem that even if the project eliminates the potential flooding of such systems, the groundwater and eventually Indian Brook would be contaminated by the leachates. This would be especially true if there was an additional loading on this small land area.

Response: Additional wastewater loadings and problems could occur in the area if existing and new residents relied on subsurface disposal systems. However, the Town of Lancaster is taking action which will help solve the water quality problems for the town as well as in the Indian Brook area. The town has constructed a new sewage treatment facility which provides an equivalent to secondary treatment. In addition the service areas have been expanded and now include the portion of town in the area of Indian Brook. When the system is fully developed municipal sewage disposal service will be available to all or most existing residences in this area and to any new development which might occur. The town has given assurances that any new development in the area will be required to connect to the public sewer system (see letter, appendix D.)

If subsurface disposal systems are still in use when the proposed project is implemented, the resulting lowering of the water table would be temporarily beneficial to the area. It would lessen the problem of improperly constructed septic systems until residents could tie into the municipal system. The project does not offer a long range solution to the water quality problems in Indian Brook.

We have revised the text of the report on pages 21, 37, 42, and 49 to reflect current and probable future conditions.

#### Advisory Council on Historic Preservation:

Comment: Compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470(f)). The section starting on page 49 of the work plan would fulfill this Environmental Impact Statement requirement if it were contained in the draft statement.

Response: References to archeological and historical resources are found on pages 12, 29, 47, and 65 of the environmental impact statement. The reference on page 47 relates directly to the section you refer to in the work plan. We have identified this with a separate heading to aid the reader.



Comments based on Compliance with Executive Order 11593  
"Protection and Enhancement of the Cultural Environment"  
of May 13, 1971.

- Comment: Under Section 2 (a) of the Executive Order, Federal agencies  
(2) are required to locate, inventory, and nominate eligible historic, architectural and archeological properties under their control or jurisdiction to the National Register of Historic Places. The results of this survey should be included in the environmental statement as evidence of compliance with Section 2 (a). In addition the statement should contain a determination of whether or not the proposed undertaking will result in the transfer, sale, demolition or substantial alteration of eligible National Register properties under federal jurisdiction.
- Response: Since this is a federally assisted local project there will  
(2) be no change in the existing responsibilities of any federal agency with respect to archeological and historic resources. However, planning on this project has followed procedures to deal with nonfederally owned sites. See response 3.
- Comment: Under Section 1 (3), Federal agencies are required to establish  
(3) procedures regarding the preservation and enhancement of non-federally owned historic, architectural, and archeological properties in the execution of their plans and programs.
- The environmental statement should contain a determination as to whether or not the proposed undertaking will contribute to the preservation and enhancement of nonfederally owned districts, sites, buildings, structures and objects of historical, architectural or archeological significance.
- Response: The Soil Conservation Service searched the National Register  
(3) of Historic Places, consulted with the New Hampshire Historic Preservation Officer, and contracted with consultants to assess archeological, architectural and historical resources in the watershed. Two items of local interest, a stone culvert and the track bed of a logging railroad, were identified. References relating to these resources are found on pages 12, 29, 47, 50, 51, and 65.

New Hampshire Department of Public Works and Highways:

Comment: The proposal has been reviewed by our Hydraulics Section. Their only comment is that the expected stream flow will cause high outlet velocities and erosion is possible. Inasmuch as no protection is indicated in the work plan, it is suggested that stone protection be installed at the culvert outlet.

Response: A statement regarding the placement of stone protection at the culverts has been included in the environmental impact statement on page 6 and in the plan on page 40.

New Hampshire Department of Resources and Economic Development:

Comment: Based on current information this office finds no properties of historic, architectural, archeological, or cultural significance affected by the project.

Response: No response necessary.

New Hampshire Office of Comprehensive Planning:

Comment: The data is presented well and in sufficient detail, with the possible exception of further explanation of site #2, as referenced on page 5 of the EIS report, and the lack of an accompanying detailed plan map.

Response: Site 2 is a single purpose floodwater retarding structure and the dam and spillways, land requirements and use are described on pages 4, 5, and 6. The illustrative drawing of site 1 on page 7 is also typical of the type of dam to be constructed at site 2. Because site 2 is a relatively simple structure, a map is not included.

Water Supply and Pollution Control Commission:

Comment: There shall be no interference with water supplies or fish  
(1) and other aquatic life.

Response: Plans and specifications for the project measures will be  
(1) submitted to the special board prior to construction as required under New Hampshire statutes, Chapter 483-A. Every precaution will be taken to preserve fish and other aquatic life. Certain measures are required of the contractor which will maintain the normal flows of water in the stream. Such measures as by-pass channels, culverts and sediment traps will be installed to maintain the flow of water with a minimum of degradation.

Comment: There shall be no lowering of the Class B water quality  
(2) during construction specifically, turbidity cannot exceed 10 units in trout water, or 25 units in non-trout water.

Response: Plans and specifications will be submitted to the Water Supply and Pollution Control Commission prior to construction as required under New Hampshire Statutes Chapter 149:8. As noted in the response above and on page 11 of statement, measures will be applied to minimize degradation of the water in the stream.

North Country Council, Inc.

Comment: On page 15, the statement mentioned that seven acres of  
(1) perpetual easements will be needed. It would be helpful to know exactly where the easements will be and impact to the local tax base.

Response: The easements will be needed on both sides of the channel in  
(1) order to do the construction and operation and maintenance in the urban area. There may be an effect on the tax base but it would be insignificant. Most of the area of the easements is presently in residential use, primarily lawns and yards. Since the land use or potential land use in the perpetual easement area will not be affected, no significant changes in values are anticipated. Any losses should be more than offset by an increase in value for the protection provided.

Comment: On page 16, we understand that the Town of Lancaster will  
(2) operate and maintain the channel work and this will be part of their annual operating budget.

Response: You are correct.  
(2)

Comment: The current population in Lancaster in 1974 was 3,500 according to the resident population published by the Office of Comprehensive Planning. On page 26, the text indicated the population of 3,300 by 1990 and 3,700 by 2020. This may have to be revised.  
(3)

Response: This 334 person increase over the 1970 census figures represents a growth of 10 percent over the past 4 years and is significant, especially since growth over the previous 10 years was only 28 or 1 percent. The population projections have not been revised since data are not available.  
(3)

Comment: On page 47, it would be helpful to have a projection of the amount of additional people which may be brought to the area because of the improvement of the facility. This projection would help determine whether or not sanitary facilities will be needed (page 6).  
(4)

Response: (4) Parking will be provided at the site for five cars. It is not known how many users will walk in. Annual use by hunters is estimated at 75 man days and by fishermen at 75-100 man days per year (see page 43). The use by hikers and naturalists was not estimated. Winter use is not expected to increase since the area is now open to hikers and snowmobilers and they will continue to have access to the area. The New Hampshire Department of Fish and Game will monitor use and water quality and install sanitary facilities if conditions warrant (see page 6 of environmental statement).

Comment: (5) The statement also refers to the possibility of 20 new acres of land being opened for potential development. The Planning Board should begin thinking about projected uses for that land.

Response: (5) As stated in the statement (pages 29 and 30) the town plan for Lancaster has recommendations concerning land use and development in this area.

Comment: (6) In addition, as you know, the NERBC is in the process of completing a supplemental study for the Connecticut River Basin. They are evaluating both structural and nonstructural alternatives regarding flooding and it would be good if you had the value of their recommendations.

Response: (6) The Soil Conservation Service is participating in the supplemental study for the Connecticut River Basin, evaluating upstream watersheds. The supplemental study will not be completed in time to fit into the schedule requirements of the study. The NERBC, in their 1980 Connecticut River Basin Plan, recommended the completion of Indian Brook Watershed Plan "subject to satisfactory completion of environmental impact evaluations".

Sierra Club, New England Chapter:

Comment: (1) The land treatment aspects of the project seem to be worthwhile conservation measures for the watershed.

Response: (1) The Soil Conservation Service has found that conservation measures have been effective in controlling erosion and protecting the land and water resources of an area.

Comment: (2) The project's structural measures protect only 30 acres from a 100-year flood level. Of 30 residences protected, only 14 are houses, 16 are mobile homes, easily moved. To spend \$196,400 in structural measures for such a small benefit seems unreasonable.

Response: Benefits and costs for the project are developed according  
(2) to standard procedures set by Congressional direction (Senate Document 97). The costs and benefits have been updated to 1975 prices for the final environmental statement. The \$251,100 cost for structural measures represents the total cost of the project including the cost of the fish and wildlife measures. The \$251,100 includes \$170,700 for flood prevention measures, \$63,000 for fish and wildlife measures; and \$17,400 for project administration. The average annual benefits attributable to flood prevention are \$19,030; the average annual costs are \$13,000 and the benefit-cost ratio is 1.5:1. See pages 17 and 18 and appendix A for additional information on the above costs and benefits.

Comment: It is stated (page 15) that the land protected will probably  
(3) be converted from agricultural use and forest to urban use - buildings. Thus reducing the area of flood prone land would increase urbanization in the flood plain. This is contrary to Federal law (Flood Disaster Act - 1973) which seeks to reduce damages due to building in the flood plain.

Response: The purpose of the project is to reduce flood damages to  
(3) existing development in the present flood plain, not to encourage new development. In the process of providing this flood protection, undeveloped land which is interspersed in the urban area will also be protected from the 100-year flood. This is likely to have two effects. The value of the land will increase and development is more likely to take place.

Also see response 4 below and response 1 under comments from the Environmental Protection Agency.

Comment: Any flood event above the 100-year level would cause more  
(4) damage to buildings in the flood plain than would occur at the present time. Dams and the channelization of 3,000 feet of the Brook would in the long run tend to increase flood damage by encouraging building in the flood plain.

Response: It is important to note that this land area and any develop-  
(4) ment will be regulated by land use ordinances of the Town of Lancaster. Since the town is in the HUD flood insurance program and is interested in continuing this coverage, the regulations, when finalized, must meet minimum HUD requirements. The regulations should minimize or eliminate increases in flood damage potential in this area. Basically, HUD uses the 100-year flood plain to define its special flood hazard areas. After the project is implemented, the area in question will be above the 100-year flood level. To totally exclude development from this area would offer the most positive control, but would seem to be unrealistic in light of land use regulations for the remainder of the town. See response 1 under comments from the Environmental Protection Agency.

Comment: How can the SCS advocate such projects?

(5)

Response: The plan for Indian Brook was formulated under the statutes of PL 566, the Watershed Protection and Flood Prevention Act, which authorizes the federal government to cooperate with legal sponsors to carry out works of improvement for flood prevention and for conservation, development, utilization, and disposal of water in watersheds. This project fulfills these objectives. It will improve the quality of the environment for those residents presently living in the flood plain and enhance the fish and wildlife habitat in the watershed area.

Comment: It is stated (appendix A) that fish and wildlife are not counted in the benefit:cost analysis because it is assumed that damages and benefits resulting from the structural aspects of the project would be equal. This assumption is not acceptable without full investigation. The point is also made that Indian Brook is not suitable for stocking by the State at the present time. Yet the report emphasizes projected recreational use for fishing (page 34), and fishing is used as a nominal benefit of the structural measures throughout the Draft Environmental Statement. If fishing other than trout fishing is meant, this should be explained fully.

(6)

Response: Because of the long history of federal and state participation in measures to enhance fish and wildlife resources, the Secretary of Agriculture has determined that benefits shall be considered at least equal to the costs for the purpose of economic justification when (1) state and local organizations agree to SCS requirements for local cooperation; (2) fishing and hunting benefits cannot be fully evaluated; and (3) the measures are managed in the public interest by an organization authorized by state law (usually a state agency) to install and maintain measures for fish and wildlife resource preservation.

(6)

The primary purpose of the fish and wildlife marsh at site 1 is to enhance the fish and wildlife habitat and population of the area (page 5 and 6). The New Hampshire Fish and Game Department will manage the area for fish and wildlife maintenance, protection and propagation.

The statement recognizes that with the regulation of the water level in site 1 there will be additional use for fishing, but this will most likely be for warm water fishing.

The Fish and Game Department has never stocked Indian Brook with fish and at the present time does not intend to in the future. The Department feels that this particular stream has a low priority in the stocking program.

The statement presents figures on projected recreational fishing demands to provide information to the reader for this activity (page 36). The figures indicate that in the upper Connecticut River Basin present resources can meet warm water fishing demands.

Comment: (7) In the statement, it is noted that Lancaster is to participate in the National Flood Insurance Program. If the town is to do this, it cannot plan to develop in the flood plain and to increase future flood damages. The project would protect to the 100-year flood level, but greater floods will occur. The SCS should assist not only in the land treatment phase of the planned project (page 30) but in coordinating floodproofing of existing buildings and other flood plain management measures. Otherwise the efforts of HUD and the SCS are at odds with one another, and will result in a waste of tax payers' money and needless flood damages.

Response: (7) The Town of Lancaster is developing a flood management plan dealing with flooding from the Connecticut River and various tributaries in the town. In addition to the plan for Indian Brook, the SCS has completed a flood hazard analysis study for the town, worked with HUD in preparation of flood insurance maps and provides continuing assistance to the town in interpreting flooding information. The SCS is also working with the town in preparation of its flood plain regulations to prevent encroachment of development within the 100-year flood plain, which is in compliance with HUD policy.

In addition to the assistance SCS has already given, the project makes available federal funds to the SCS to provide accelerated technical assistance to the Town to assist in correcting its water resource problems. Such assistance may include floodproofing of existing buildings, relocation of buildings and other flood plain management measures which are needed.

Comment: (8) It is appropriate here to mention that two members of our Executive Committee are members of the Science Advisory Group to the New England River Basins Commission's Connecticut River Basin Program. Indian Brook, the subject of the projects under discussion, is a part of the Connecticut Basin. A study is in progress on the flood management of the Connecticut Basin with respect to various methods of reducing flood damages. The Science Advisory Group recently passed a resolution that the Indian Brook Project not be implemented until completion of the Supplemental Study on the Connecticut Basin, so that the conclusions reached may be applied to this portion of the Basin. We concur with this resolution in the interests of sound planning.

Response: The planning of the Indian Brook project has been carried out under federal laws governing water resources planning and development, including development of environmental statements. The New England River Basins Commission in its 1980 Connecticut River Basin Plan recommends the Indian Brook Project, subject to satisfactory completion of environmental impact evaluations. This environmental impact statement has been prepared to meet that requirement. (See page 86.)

Comment: In this regard it should be noted that the Draft Environmental Statement on Indian Brook reflects the philosophy that floods are bad and should be contained (by dams and by deepening brook channels). Recent trends in flood management are towards nonstructural methods. The statement on page 43 "The protection provided will encourage development", we consider to be the opposite result from the one that flood plain management requires.

Response: The Soil Conservation Service and the sponsors have formulated the plan for Indian Brook watershed in accordance with PL 83 566, the Watershed Protection and Flood Prevention Act, and reflects the philosophy therein. It does not say that flooding is bad, but rather that erosion, floodwater and sediment damages can be. This applies to Indian Brook. (See page 33 and 34.) It should be noted that any development would take place in a planned manner outside the with-project 100-year flood line.

Also, see response 3.

Comment: Channelization is planned to lower the brook some 7 feet and to lower the water table as well. The effect of the concrete wall across the brook at the head of the channel is not fully examined in the Statement. Will the water table in fact be lowered? How is this known, and what would be the effect on springs and wells in the area? If the flood plain houses (14) are to be sewerred in the future anyway, this will reduce the septic problem without the necessity of dams and the channel to lower floods.

Response: The modified channel will be 6 to 7 feet deep. The channel bottom will be 4 feet lower than in the present channel, which is about 3 feet deep. The draft environmental statement has been corrected on page 42 to reflect this.

As described on page 11 the concrete grade stabilization structure will drop the water about 6 feet and provide for channel installation on a nonerosive grade. The channel will be constructed in material composed of loose underlying sands (see page 20) which are pervious and saturated with water. Deepening of the channel will permit water from this sand layer to move into the channel. The effect on ground water levels were estimated using techniques described in the SCS National Engineering Handbook on drainage.



As noted on page 42 of the statement, the channel deepening will have an effect on the ground water table adjacent to the channel. Local officials indicate that there are no known springs or wells adjacent to the channel. The project will affect no individual water supplies since all residences and businesses within the area of influence utilize the municipal water supply system. The statement recognizes that the septic problem will be alleviated over the years as additional residences tie into the municipal sewerage system (see page 37). To date most of the permanent dwellings and about half of the mobile homes are hooked up to the municipal system. The primary purpose of the dams and channel work is to reduce flood damages.

Also see response to comment 2 from Environmental Protection Agency.

Comment: Even with all structures completed, a very large flood (500-  
(11) year) would still flood the town of Lancaster to over 2 feet -  
only with the projected development (after the structures),  
more damage would result to buildings than now.

Response: See responses 3 and 4.  
(11)

Comment: Equating present and altered conditions at the dam sites as  
(12) far as fish and wildlife are concerned is not adequate. And  
the reference on beaver-trout relationships is not pertinent,  
if, as said, the stream is unsuited to trout.

Response: The statement (pages 43 to 46) discusses in some detail the  
(12) effects on the fish and wildlife resources which can be  
expected to take place at the dam sites.

It is not the intention to infer any relationship between beaver and trout, only to relate impoundment sites to beaver ponds which they replace and the effect on water temperatures. The reference relates to this subject.

Comment: Flood Insurance - It appears that the Flood Insurance  
(13) alternative has long term benefits not given sufficient  
weight. Flood prone areas would be protected from devel-  
opment of buildings. This would prevent future damages  
above the 100-year flood level. This benefit was not  
discussed.

Response: The HUD flood insurance program does have long term benefits  
(13) in that the program requires the municipality to adopt flood  
plain regulations. This is true whether the project is  
installed or not. The program requires that any new devel-  
opment within the area of special flood hazards must be

built in a manner that the lowest floor be elevated to or above the level of the 100-year flood or be floodproofed up to the level of the 100-year flood. Response No. 4 discusses in more detail the effect of the project on the 100-year flood plain.

Comment: The adverse effects of lowering the water table were not  
(14) discussed.

Response: The effects of lowering the water table are discussed on  
(14) page 42 in the statement.

Also see response 10.

Comment: Flood Proofing - The cost is set at \$62,000. The 100-year  
(15) flood only causes \$80,000 in damages. If the houses were floodproofed and the trailers moved, it would seem to be a less costly method than the proposed structures.

Response: The alternative of relocation of mobile homes and flood-  
(15) proofing of permanent residences is discussed in the alternatives section on page 56.

Also see comment and response 17 and 18.

Comment: The fish and wildlife improvements are not validly cited  
(16) because they did not enter into the benefit:cost analysis.

Response: See comment No. 6.  
(16)

Comment: Relocation - The cost is said to be \$515,000. This would  
(17) appear to be an inflated figure, but there are insufficient data to see how it was derived. Only 14 houses are involved, and they are said to be substandard housing. The 16 trailers could be easily moved. Flood prone land is not costly to acquire - only \$50 per acre the Statement said. (page 26). Only 30 acres of land is the amount involved. Improved land is \$1,200 per quarter acre, (for relocation). The SCS has been involved in land acquisition of flood plains in some parts of the country. This would seem to be an alternative worth investigating here.

Response: The \$660,000 (revised to 1975 price base) includes the costs  
(17) of finding another home for each of the 14 families, the construction of a new park for the 16 mobile homes and the purchase in fee title or easements on land which is in the urban area are reflected.

In addition, the reader is referred to discussions on pages 29 and 30 of the environmental statement which outline some of the problems of relocation. Soils throughout most of the town are subject to limitations for urban use. The town

plan recommends accommodating new growth in the existing service area of the village as the most economical and as the best way to preserve the natural qualities of the community. Relocation of 30 families would have an impact on the persons involved, the town and the environment. The \$50 per acre value noted in the above comment is a value set for wet forest land. It does not represent the value of flood plain land in the urban area. The cost of this developed or developable land, which has municipal water and sewerage available, is \$1,200 per quarter acre.

SCS involvement in land acquisition has been limited to assisting sponsors, including cost sharing, to secure land rights for installation of measures.

Comment: Land use controls, flood proofing, and relocation - This  
(18) cost is set at \$170,000. This is less than the \$196,400 for the proposed structures. Not reducing the level of flooding in the flood plain is a benefit not a cost (see HUD flood insurance and SCS participation, p. 50).

Response: The \$251,100 (revised to reflect 1975 prices) cost represents  
(18) the total cost of the project including fish and wildlife development costs. Flooding in the urban area damages structures and grounds in the flood plain. These damages are a cost to someone if the structures and grounds are to be restored to their original condition. A benefit is derived from reducing flood damages and these restoration costs. (See comments and responses No. 2, 15, and 17.)

Comment: The average annual cost of the project is \$11,600 (page 55,  
(19) work plan). The average annual damages are \$7,330 (page 32 - DEIS). How can these figures yield a positive benefit:cost ratio of 1.2:1?

Response: The benefit:cost ratio for the structural measures is cal-  
(19) culated from the benefits and costs (revised to reflect 1975 prices) shown in appendix A. This includes flood damage reduction benefits of \$11,530, changed land use values of \$2,200, redevelopment benefits of \$3,700 and secondary benefits of \$1,600 which total \$19,030. When compared to the cost of \$13,000 a benefit:cost ratio of 1.5:1 results.

The figure of \$7,330 (revised \$11,130) correctly represents direct average annual flood damages. Indirect damages, attributed to interruption of services, delay of normal activities and rerouting of traffic were estimated at \$1,110 (\$1,700 revised) and added to the direct damages. This total damage of \$8,440 (\$12,830 revised) is used in determining flood damage reduction benefits. Land treatment measures provide flood damage reduction benefits of \$800 (\$1,300 revised) annually (see note 2, appendix A). The remaining damage reduction of \$7,640 (\$11,530 revised) is attributed to the structural measures.

A brief description of the other benefits is given below. Redevelopment benefits were based on expected employment of unemployed and underemployed local laborers during construction and during early stages of operation and maintenance. Changed land use benefits were based jointly on expected changes resulting from flood plain protection and on local real estate values. Secondary benefits were estimated to be 10 percent of the total direct project benefits.

Comment: (20) The Draft Environmental Statement does not make a convincing case for constructing the project (2 dams, 1 small concrete wall across the stream, and a channelization of 3,000 feet).

Response: (20) The plan for Indian Brook watershed was formulated under current laws and regulations and meets requirements for flood prevention measures at a favorable benefit-cost ratio. The sponsors selected the plan that best meets their objectives. In addition, the plan enhances the fish and wildlife resources of the area.

Comment: (21) Land treatment, plus floodproofing, relocation, and land acquisition are acceptable alternatives, considering all benefits and costs.

Response: (21) This alternative was considered by the sponsors but it has disadvantages which were felt to be significant. Relocation of 16 families would create hardships. The relocation would require additional land in the town and would create additional impact on the town. The floodproofed homes would still be on a flood plain which is frequently flooded. Additional discussion is found in the alternative section on pages 54, 55 and 56.

Also see response 17.

Science Advisory Group (Connecticut River Basin Program):

Comment: The Science Advisory Group notes that the Indian Brook watershed project was approved in the NERBC 1980 Basin Plan "subject to satisfactory completion of environmental impact evaluation". The Group further notes that "satisfactory completion" requires that "1) the capability has been developed and used to form a reasonable assessment of regional environmental consequences, 2) environmental consequences have been assessed by the commission in the case of projects having regional impacts; and 3) it is shown that environmental consequences will be acceptable". The draft environmental statement does not reflect the capability to provide an acceptable assessment of environmental impacts of flood management plans that is being developed in the Connecticut River Supplemental Study.

The Science Advisory Group recommends that the New England River Basins Commission (NERBC):

- 1) Withhold approval of the Indian Brook project
- 2) Withhold approval of all such flood management projects until the Supplemental Study is completed or until environmental impact statements utilizing the information and techniques generated in the Supplemental Study are submitted.

Response: The Science Advisory Group resolution appears to be based on the interpretation that NERBC intended to exercise independent judgement on environmental acceptability of environmental alterations (structural projects) specified in its plan. This would include projects lacking interstate/regional impacts and, further, that the supplemental study would provide the technical basis for NERBC's judgement.

This matter was considered by the Connecticut River Basin Program (CRBP) Coordinating Group<sup>1/</sup>. At its meeting on March 14, 1975 the Coordinating Group, by consensus, agreed that NERBC's intent is that 1) the environmental acceptability of projects included in the NERBC 1980 Basin Plan is not referred back to NERBC but rather to the statutory environmental review process under the National Environmental Policy Act and companion state legislation; 2) NERBC retains statutory authority to conduct special studies, including environmental assessments of projects having interstate/regional impacts and 3) the 1980 basin plan is not generally intended to stop component projects, but rather, augmented by the supplemental study, to provide a useful and relevant information base for regional decisions. With respect to PL 566 projects, the work proposal and environmental impact statement provide the basic framework for decisions.

This clarification of procedure indicates that the environmental statement is not in disagreement with NERBC guidelines.

---

<sup>1/</sup> The CRBP Coordinating Group consists of representatives of NERBC member states (Connecticut, Massachusetts, New Hampshire and Vermont) and four member federal agencies (Agriculture, Army Corps of Engineers, Environmental Protection Agency, and Interior). The function of the Coordinating Group is to establish program policy by consensus on questions concerning interstate coordination of basin resource planning, plan implementation and plan revision. Their policy is--and must be compatible with--NERBC policy and actions and therefore subject to approval or modification by NERBC.



LIST OF APPENDICES

- Appendix A - Comparison of Benefits and Costs for Structural Measures
- Appendix B - Project Map
- Appendix C - Letters of Comment Received on Draft Environmental Statement
- Appendix D - Correspondence from Town of Lancaster on policy of connecting to public sewage disposal facilities
- Appendix E - Resolution from Science Advisory Group (Connecticut River Basin Program)

APPROVED BY Donald G. Burbank DATE 3-8-76  
Donald G. Burbank  
State Conservationist

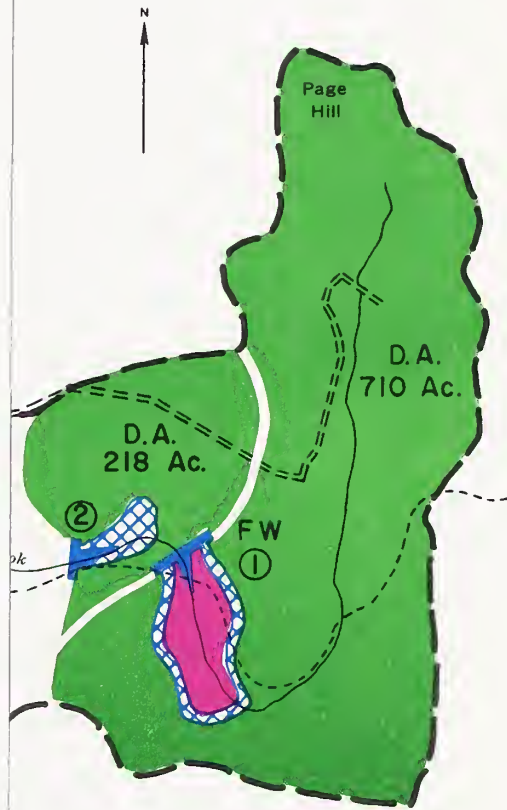
COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Indian Brook Watershed, New Hampshire  
(Dollars)




Evaluation Unit	AVERAGE ANNUAL BENEFITS <sup>1/</sup>				3/ Average Annual Cost	4/ Benefit Cost Ratio
	Damage Reduction	Changed Land Use	Redevelopment	Secondary		
1. Multiple-purpose site; 1 flood retarding and channel work	11,530	2,200	3,700	1,600	12,000	1.6:1
Project Administration	xxx	xxx	xxx	xxx	1,000	
GRAND TOTAL	11,530	2,200	3,700	1,600	19,030	1.5:1

- 1/ Price Base 1975 except adjusted normalized prices for crop and pasture.  
2/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$1,300 annually.  
3/ Interest rate 5-7/8 percent; amortization period 100 years.  
4/ Fish and wildlife benefits and costs are assumed to be equal and are not included in this comparison.





PROJECT MEASURES

-  Floodwater Retarding Structure
-  Multiple-purpose Structure (FW - Fish and Wildlife Development)
-  Channel Improvement for Flood Prevention

OF AGRICULTURE  
ATION SERVICE

CT MAP  
K WATERSHED  
NEW HAMPSHIRE  
er 1971

2 Miles

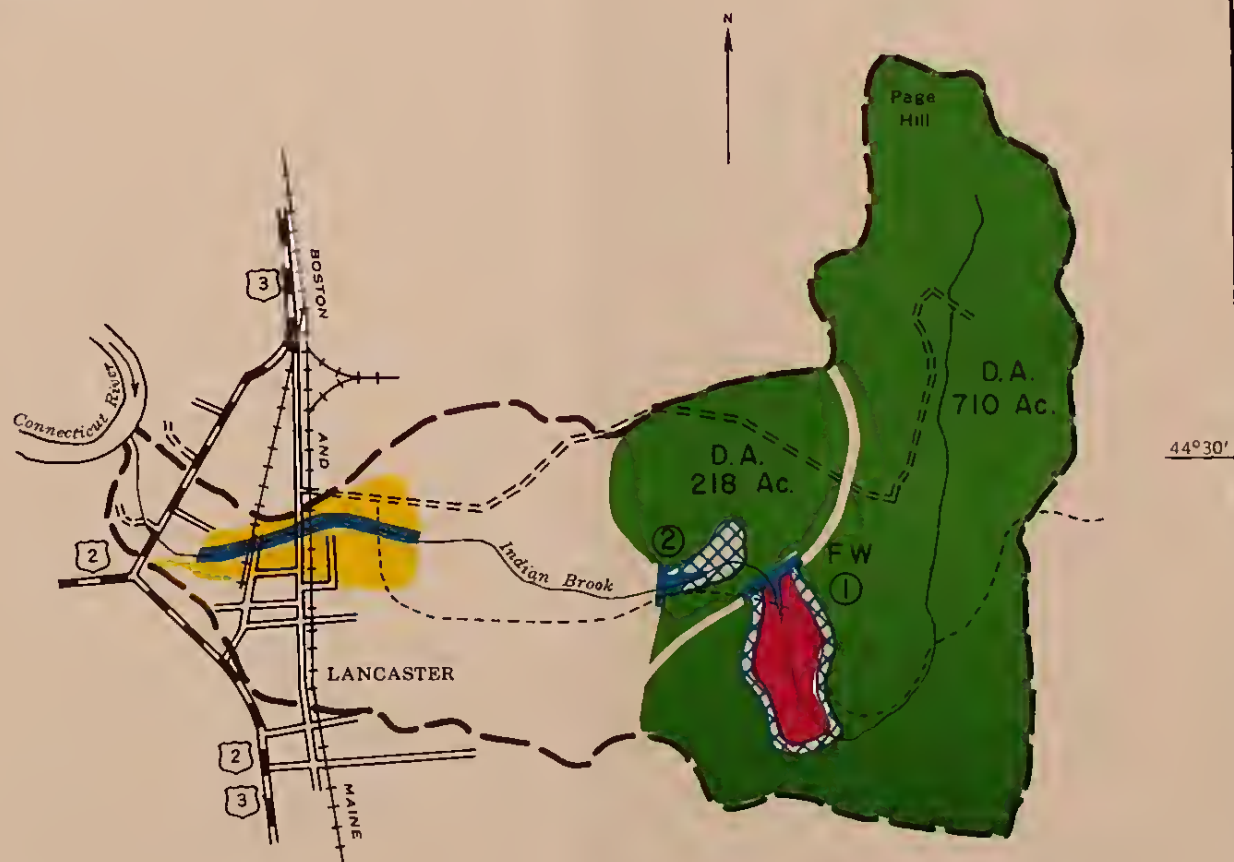




Location Map

71°30'

APPENDIX B



LEGEND

- First Class Roads
- Second Class Roads
- Unimproved Road
- Logging Railroad Bed
- Railroad
- Stream
- Watershed Boundary
- Drainage Area Controlled by Structure
- Area Benefited
- Drainage Area in Acres

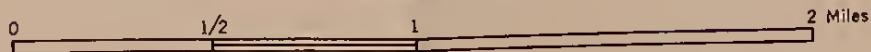
PROJECT MEASURES

- Floodwater Retarding Structure
- Multiple-purpose Structure (FW - Fish and Wildlife Development)
- Channel Improvement for Flood Prevention

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

PROJECT MAP  
INDIAN BROOK WATERSHED  
COOS COUNTY, NEW HAMPSHIRE

October 1971







December 30, 1974

Mr. Donald G. Burbank  
State Conservationist  
Soil Conservation Service  
United States Department of  
Agriculture  
Federal Building  
Durham, New Hampshire 03824

Dear Mr. Burbank:

The draft environmental impact statement for "Indian Brook Watershed - Lancaster, Coos County, New Hampshire," which accompanied your letter of November 1, 1974, has been received by the Department of Commerce for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

A comparison of the costs and the benefits of the proposed program has not been summarized in the draft environmental impact statement. We recommend that the costs and benefits of the general factors associated with each plan be presented in tabular form to permit the determination of numerical ratios which justify the plan selected.

Thank you for giving us an opportunity to provide these comments which we hope will be of assistance to you. We would appreciate receiving a copy of the final statement.

Sincerely,

*Sidney R. Galler*  
Sidney R. Galler

Deputy Assistant Secretary  
for Environmental Affairs



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
REGION I  
JOHN F. KENNEDY FEDERAL BUILDING  
GOVERNMENT CENTER  
BOSTON, MASSACHUSETTS 02203

APPENDIX

OFFICE OF  
THE REGIONAL DIRECTOR

2 JAN 1975

Mr. Donald G. Burbank  
State Conservationist  
Soil Conservation Service  
U.S. Department of Agriculture  
Federal Building  
Durham, New Hampshire 03824


Dear Mr. Burbank:

HEW's Regional Environmental Council has reviewed the draft Environmental Impact Statement for Indian Brook Watershed, New Hampshire.

It appears that those impacts within the scope of this Department's review have been adequately addressed.

Thank you for giving us the opportunity to comment on this draft statement.

Sincerely yours,

  
Robert Fulton  
Regional Director



# United States Department of the Interior

OFFICE OF THE SECRETARY  
NORTHEAST REGION  
JOHN F. KENNEDY FEDERAL BUILDING  
ROOM 2003 J & K  
BOSTON, MASSACHUSETTS 02203  
January 21, 1975

ER 74/1376

Mr. Donald G. Burbank  
State Conservationist  
United States Department of  
Agriculture  
Soil Conservation Service  
Federal Building  
Durham, New Hampshire 03824

Dear Mr. Burbank:

The following constitutes our review and comments on the draft Environmental Impact Statement and draft Work Plan for Indian Brook Watershed, Lancaster, Coos County, New Hampshire. Our comments were prepared in response to your letter dated November 1, 1974, to the Director, Office of Environmental Project Review, U. S. Department of the Interior.

## Comments On Draft Work Plan

It is the policy of the Department of the Interior to oppose channelization as a flood control measure where such work is planned for an area which has specific fish and wildlife values. However, for the proposal under consideration, we note that the State Fish and Game Agency does not place any significance on the fish and wildlife values in this 3,000-foot reach of stream. We believe the work plan and draft statement would be materially improved if there were a more detailed description of these values in this reach. Such information would clarify the position taken by the State Fish and Game Agency.

A basic impact of this project is the expansion of urbanization into the flood plain as a result of providing a high level of flood plain protection. We believe such actions require clarification since it appears to be inconsistent with the policy guidelines set forth in Watershed Memorandum 108, Section 5, Executive Order 11296 and the goals and objectives of HUD's flood insurance program for the Town of Lancaster which was approved in 1973.



The proposed project will not adversely affect any existing or proposed unit of the National Park System or any known historic, natural, or environmental education sites eligible for the National Landmark Programs.

Subsequent to review distribution of these subject documents, the New Hampshire Historic Preservation Office, over the signature of Ms. Mary M. Jeglum, Director, on November 18, sent a negative commentary to the Soil Conservation Service. We would expect that letter to be made a part of the Final Environmental Statement.

Neither the draft environmental statement nor the work plan give adequate treatment to archeological aspects. The name of the qualified archeologist who performed the site investigation, and more of his or her findings, should be shown and discussed in the environmental statement. If any further archeological survey work or evaluation are needed, we would suggest Dr. Marley Brown, State Archeologist, Department of Anthropology, Franklin Pierce College, Ridge, New Hampshire 03461. Correction of this deficiency can be made and shown in the Final Environmental Statement.

#### Abbreviated Environmental Quality Plan

Environmental quality of the watershed would not be enhanced by channelization of 3,000 feet of stream. More enhancement could be achieved by installing water level control structures at Sites 1 and 2, and allow the New Hampshire Fish and Game Department to regulate water levels on a schedule most beneficial to fish and wildlife. Our suggested environmental quality plan would include water level control structures at the two sites, no channelization, flood plain management with no additional non-flood-proof development in the flood plain, and any necessary land treatment measures.

#### Summary of the Plan -- Page 2 - Paragraph 3

It is questionable whether or not the individual landowners will be willing to bear the costs of land treatment measures. In view of the economic impoverishment of the area, as indicated in the median income information on Page 10, it is doubtful whether landowners will be willing to institute land treatment measures that may not produce short-term gains. The same comments apply to other parts of the work plan where the land treatment measures are discussed (Pages 3, 15, 35, 57, 59, and 61).

#### Effects of Works of Improvement

##### Flood Prevention, Erosion and Sediment

Page 45 - Paragraph 1 - Implementation of land treatment measures to reduce peak run-off is questionable. See comments on "Summary of the Plan" above.



Page 3

Page 45 - Paragraph 4 - It is stated that application of land treatment measures will prevent annual erosion rates from exceeding acceptable limits established for the area. Yet, on Page 17, Paragraph 2, it is mentioned that the estimated existing soil loss rate for wood land, hay land, the pasture approaches the minimum attainable. Page 17, Paragraph 1, states that there are no critical erosion areas creating sediment problems. It seems that this problem is so minor already there is no justification for land treatment measures for this purpose.

On Page 45, Paragraph 7, and on Pages 37 -38 of the draft environmental impact statement, it is stated, "Along the present channel, the ground water level was found to be the same as the water level in the channel indicating a close relationship between the two." It is not clear if available data would indicate that this relationship holds true for all non-flood flows. If so, a statement on the present channel depth and minimum flow conditions would allow an assessment of water-table fluctuations that occur. In the last sentence of that same paragraph (in both texts), it would be appropriate to specify that estimates indicate that drier basements and more efficient operation of septic systems would be limited to three residences within 500 feet of the channel, and that these improvements might only be experienced during low-flow conditions.

#### Investigation and Analysis

##### Page 82 - Paragraph 4

It is stated, "Analyses indicate that drawdown effects upon basements would extend up to 500 feet from the channel during dry weather, low-flow conditions." It would be more appropriate to state that analyses indicate that during low-flow periods, ground-water levels within 500 feet of the channel would be lower than they are under present conditions.

#### Comments on Draft Environmental Impact Statement

Potential adverse environmental impacts related to geologic conditions appear to have been given adequate consideration in the draft environmental statement and accompanying work plan. The statement appears outstanding in its comprehensive description and evaluation of the proposed watershed project. Among the noteworthy features is what appears to be a particularly accurate delineation of flood plain in the vicinity of proposed channel enlargement (Figure 3 in the environmental impact statement).

#### Planned Project

Page 3 - Paragraph 1 - It is stated that land treatment measures will be installed by landowners dependent upon their individual interests, their

Page 4

means to do so, and applicable state and local laws. Technical assistance will be provided. In view of the economic impoverishment of the watershed area, as indicated in the median income information given on Page 27, it should be indicated to what extent it is likely that landowners will be willing to institute land treatment measures that may not bring them short-term gains. If the likelihood is small, or does not exist at all, then this project element would have to be considered irrelevant as a feasible measure.

#### Environmental Impacts

##### Conservation Land Treatment

Page 37 - Paragraph 1 - Implementation of land treatment measures to reduce peak run-off is questionable.

Page 37 - Paragraph 4 - It is stated that application of land treatment measures will prevent annual erosion rates from exceeding acceptable limits established for the area. Yet, on Page 33, Paragraph 2, it is mentioned that the estimated existing soil loss rate for wood land, hay land, and pasture approaches the minimum attainable. Paragraph 1 states that there are no critical erosion areas creating sediment problems. It seems that this particular problem is so miniscule already that there is no justification for implementation of land treatment measures for this purpose.

##### Favorable Environmental Effects

Page 45 - First Effect - It is a doubtful benefit (see comment under LAND TREATMENT).

This letter supersedes those advance comments from the Department of the Interior under our cover memorandum of January 10, 1975.

Sincerely yours,

*William Patterson*  
*for* Roger Sumner Babb  
Special Assistant to  
the Secretary



DEPARTMENT OF TRANSPORTATION  
UNITED STATES COAST GUARD

MAILING ADDRESS:  
U.S. COAST GUARD (G-WS/73)  
400 SEVENTH STREET SW.  
WASHINGTON, D.C. 20590  
PHONE: (202) 426-2262

APPENDIX 3

16 DEC 1974

Mr. Donald G. Burbank  
State Conservationist  
Soil Conservation Service  
Federal Building  
Durham, New Hampshire 03824

Dear Mr. Burbank:

This is in response to your letter of 1 November 1974 addressed to Commandant, U. S. Coast Guard concerning a draft environmental impact statement for the Indian Brook Watershed, Coos County, New Hampshire.

The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this draft statement is appreciated.

Sincerely,

*W E. Caldwell*

W. E. CALDWELL  
Captain, U.S. Coast Guard  
Deputy Chief, Office of Marine  
Environment and Systems  
By direction of the Commandant



Advisory Council  
On Historic Preservation

1100 East Street, N.W. Suite 500  
Washington, D.C. 20004

AD-100-100

January 7, 1975

Donald G. Burbank  
State Conservationist  
United States Department  
of Agriculture  
Soil Conservation Service  
Federal Building  
Durham, New Hampshire 03824

Dear Mr. Burbank:

This is in response to your request of November 1, 1974, for comments on the environmental statement for Indian Brook Watershed, Lancaster, Coos County, New Hampshire. Pursuant to its responsibilities under Section 102 (2) (C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that while you have consulted the State Historic Preservation Officer, your draft environmental statement is inadequate regarding our area of expertise as it does not contain sufficient information to enable the Council to comment substantively. Please furnish additional data indicating:

- a. Compliance with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470 (f)). The section starting on page 49 of the work plan would fulfill this Environmental Impact Statement requirement if it were contained in the draft statement.
- b. Compliance with Executive Order 11593 "Protection and Enhancement of the Cultural Environment" of May 13, 1971.
  1. Under Section 2 (a) of the Executive Order, Federal agencies are required to locate, inventory, and nominate eligible historic, architectural and archeological properties under their control or jurisdiction to the National Register of Historic Places. The results of this survey should be included in the environmental statement as evidence of compliance with Section 2 (a).

2. Until the inventory required by Section 2 (a) is complete, Federal agencies are required by Section 2 (b) of the Order to submit proposals for the transfer, sale, demolition, or substantial alteration of federally owned properties eligible for inclusion in the National Register to the Council for review and comment. Federal agencies must continue to comply with Section 2 (b) review requirements even after the initial inventory is complete, when they obtain jurisdiction or control over additional properties which are eligible for inclusion in the National Register or when properties under their jurisdiction or control are found to be eligible for inclusion in the National Register subsequent to the initial inventory.

The environmental statement should contain a determination as to whether or not the proposed undertaking will result in the transfer, sale, demolition or substantial alteration of eligible National Register properties under Federal jurisdiction. If such is the case, the nature of the effect should be clearly indicated as well as an account of the steps taken in compliance with Section 2 (b). (Procedures for compliance with the Executive Order are detailed in the Federal Register of January 25, 1974, "Procedures for the Protection of Historic and Cultural Properties," pp. 3366-3370.)

3. Under Section 1 (3), Federal agencies are required to establish procedures regarding the preservation and enhancement of non-federally owned historic, architectural, and archeological properties in the execution of their plans and programs.

The environmental statement should contain a determination as to whether or not the proposed undertaking will contribute to the preservation and enhancement of non-federally owned districts, sites, buildings, structures and objects of historical, architectural or archeological significance.

We have no further comments on the work plan. To insure a comprehensive review of historical, cultural, archeological, and architectural resources, the Advisory Council suggests that the environmental statement contain State Historic Preservation Officer's comments concerning the effects of the undertaking upon these resources.

Should you have any questions or require any additional assistance, please contact Stephen Cochran of the Advisory Council staff at 202/254-3974

Sincerely yours,



John D. McDermott  
Director, Office of Review  
and Compliance







UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION I  
Room 2203 - (617)-223-4635  
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

APPENDIX

January 7, 1975

Mr. Donald G. Burbank, State Conservationist  
Soil Conservation Service  
United States Department of Agriculture  
Federal Building  
Durham, New Hampshire 03824

RE: Draft Environmental Impact  
Statement for the  
Indian Brook Watershed  
Lancaster, New Hampshire

Dear Mr. Burbank:

We have completed our review of the draft environmental impact statement on the proposed changes in the Indian Brook Watershed. As a summary of our review, we have the following comments to offer.

The impact statement seems to provide an adequate assessment of most of the associated impacts of the proposed action. There are two areas, however, where we feel that there should be reassessments and hopefully, changes in the final statement.

One point of concern is with regard to the land use plans and the encroachment of urban development on the flood plain area. It is our interpretation of the statement that the proposed project is to protect 30 families currently located within the flood plain of Indian Brook. However, the statement indicates that approximately 17 additional acres of flood plain will be available to urban development if the project is implemented. This flood plain encroachment appears to be in direct contrast to policies of sound land use planning. Before we could concur with this project, plans would have to be developed excluding the possibility of any permanent dwellings in this area. We would further suggest that this 20-acre parcel of land be used for some type of recreational facility that would not be subjected to flood damage.

A second point of the draft statement that we would like to see a more complete assessment of is the existing subsurface disposal systems. It would seem that even if the project eliminates the potential flooding of such systems, the groundwater and eventually Indian Brook would be contaminated by the leachates. This would be especially true if there was an additional loading on this small land area.



Mr. Donald G. Burbank  
January 7, 1975  
Page Two

The final statement should include the feasibility of municipal sewage disposal and/or any steps which might be taken to improve existing subsurface disposal systems.

Because of the potentially serious impacts associated with flood plain encroachment and its related effects, we have rated this draft statement ER-1. This rating is in accordance with our national rating system, a copy of which is enclosed.

Thank you for sending us a copy of the draft statement. As soon as the final statement is printed, we would like to be put on the mailing list for five copies.

If you have any questions relating to the Indian Brook Watershed, just give us a call.

Sincerely yours,

*Wallace E. Stickney*

Wallace E. Stickney, P.E.  
Director  
Environmental Impact Office

Enclosure



## EXPLANATION OF EPA RATING

APPENDIX C

### Environmental Impact of the Action

#### LO -- Lack of Objections

EPA has no objections to the proposed action as described in the draft environmental impact statement; or suggests only minor changes in the proposed action.

#### ER -- Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating federal agency to reassess these aspects.

#### EU -- Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

---

### Adequacy of the Impact Statement

#### Category 1 -- Adequate

The draft environmental impact statement sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

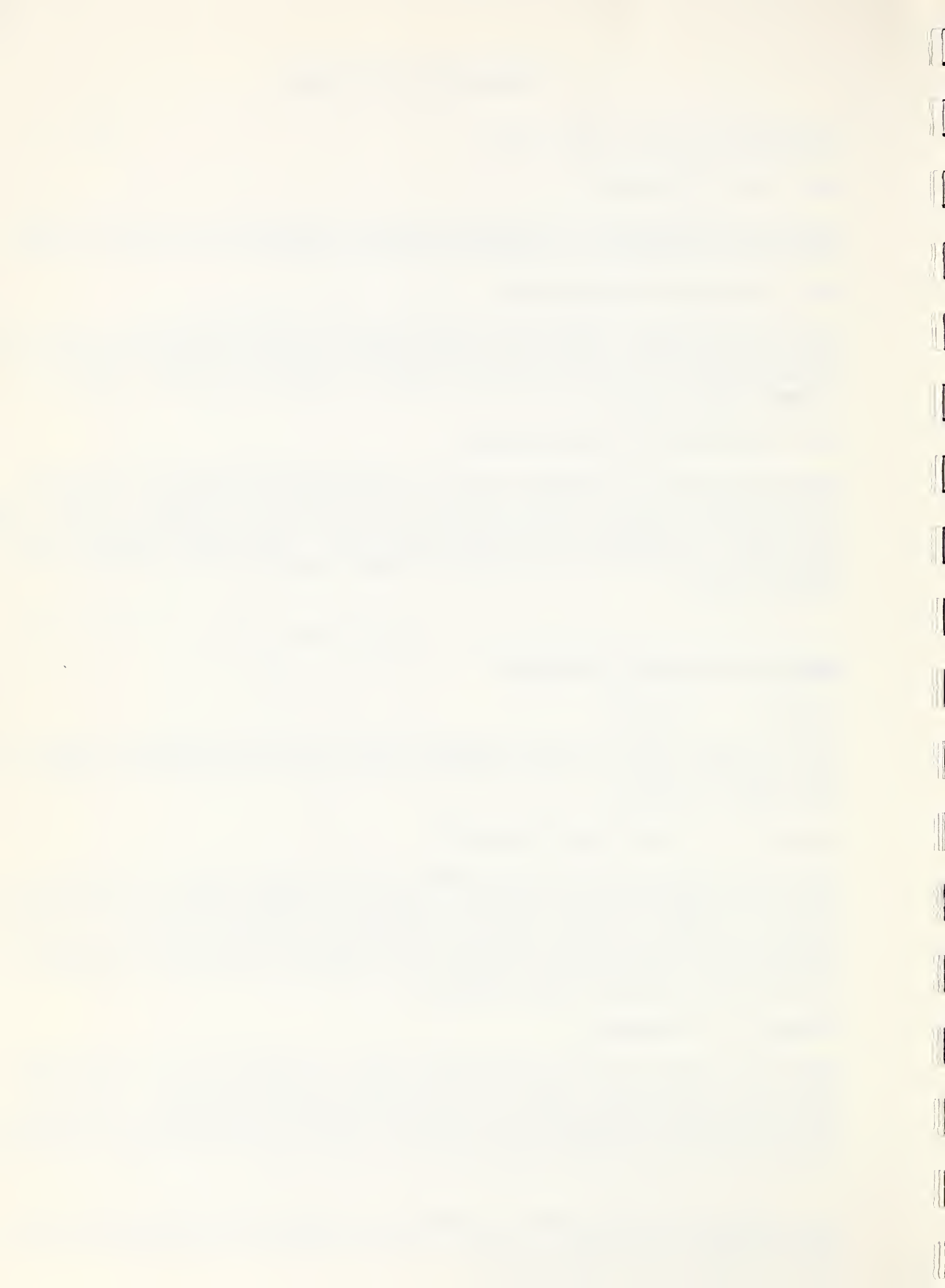
#### Category 2 -- Insufficient Information

EPA believes that the draft environmental impact statement does not contain sufficient information to assess fully, the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft environmental impact statement.

#### Category 3 -- Inadequate

EPA believes that the draft environmental impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement.

If a draft environmental impact statement is assigned a Category 3, no rating will be made of the project or action; since a basis does not generally exist on which to make such a determination.





STATE OF NEW HAMPSHIRE  
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS  
JOHN O. MORTON BUILDING

BERT H. WHITAKER, P.E.  
COMMISSIONER

CONCOR. M.B. 63301

November 20, 1971

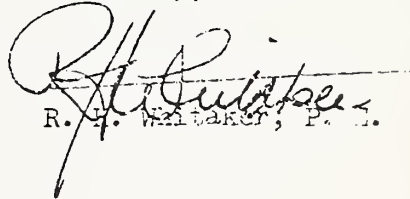
Mr. Donald G. Burbank  
State Conservationist  
Soil Conservation Service  
Federal Building  
Durham, New Hampshire 03824

Dear Mr. Burbank:

We appreciate the receipt of your draft work plan and draft Environmental Statement for the Indian Brook Watershed in Lancaster, New Hampshire.

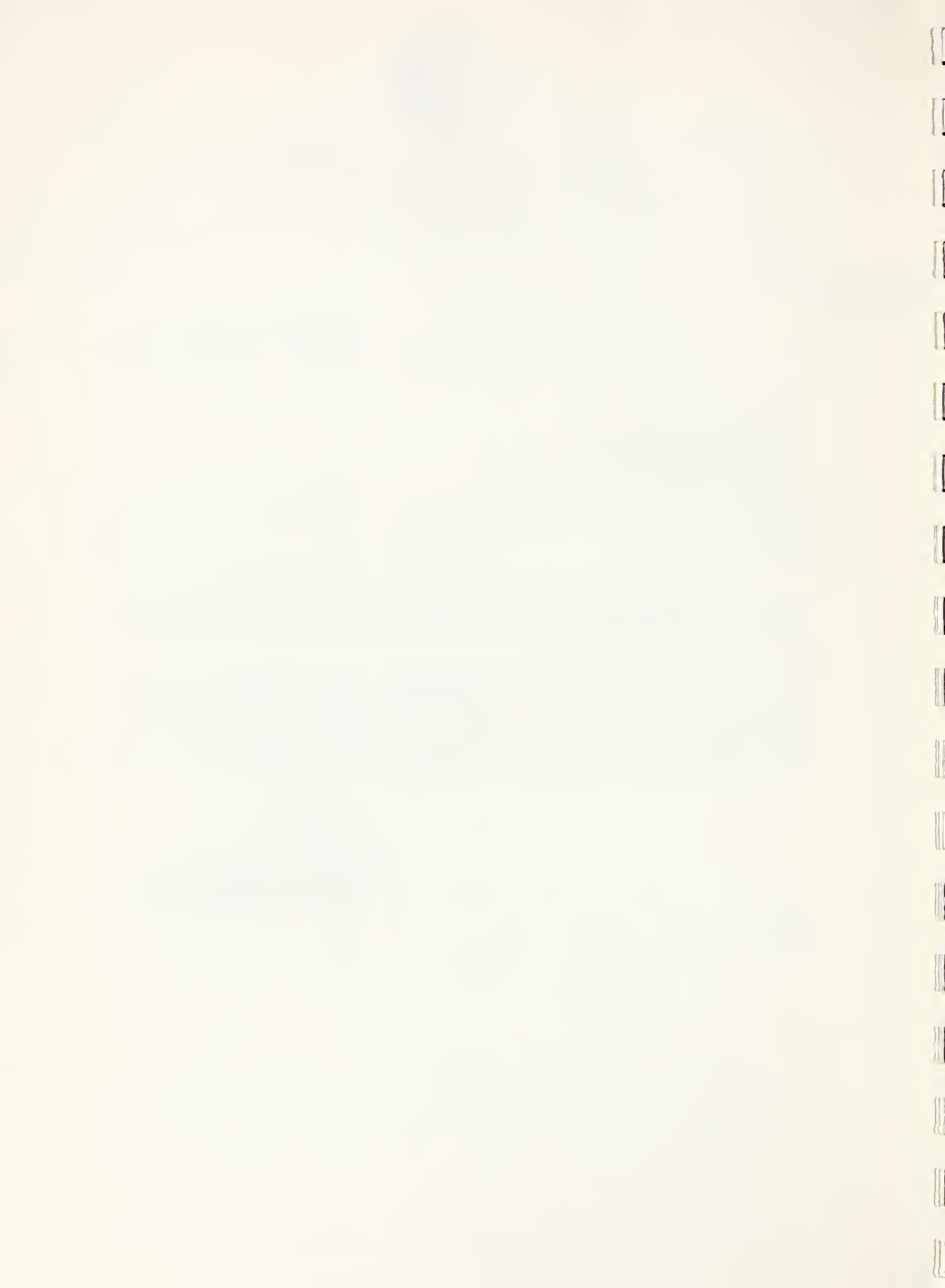
The proposal has been reviewed by our Hydraulics Section. Their only comment is that the expected stream flow will cause high outlet velocities and erosion is possible. Inasmuch as no protection is indicated in the work plan, it is suggested that stone protection be installed at the culvert outlet.

Sincerely,



R. H. Whitaker, P. E.

RHW:r







AMERICAN

NEW HAMPSHIRE DEPARTMENT of RESOURCES and ECONOMIC DEVELOPMENT

GEORGE GILMAN  
COMMISSIONER

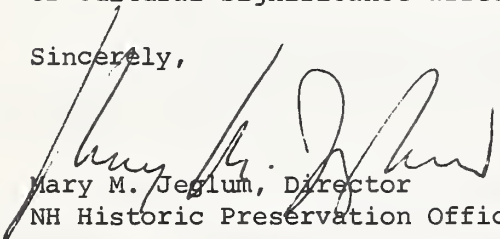
November 18, 1974

Donald G. Burbank  
State Conservationist  
US Department of Agriculture  
Soil Conservation Service  
Federal Building  
Durham, NH 03824

Dear Donald Burbank:

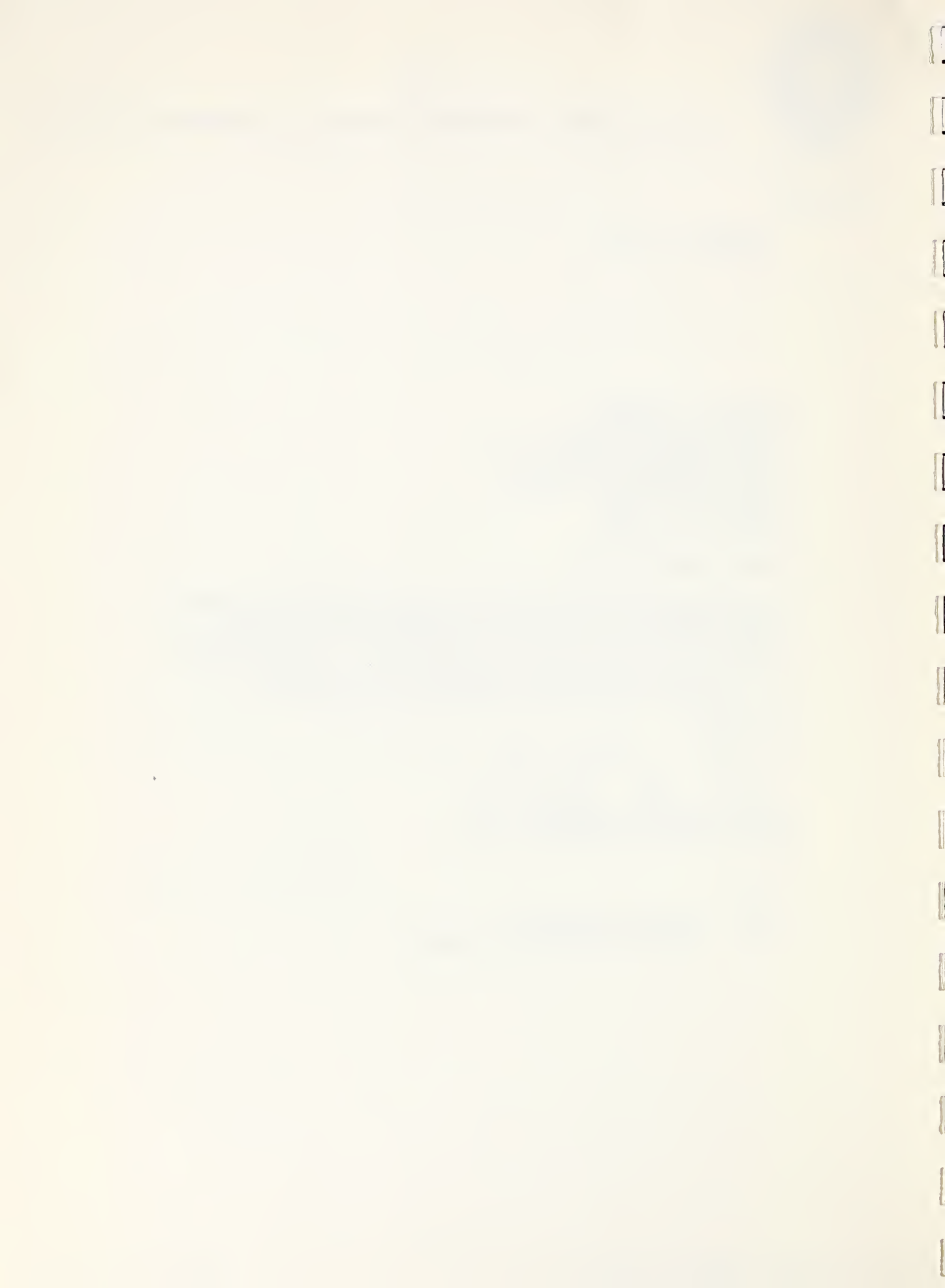
In response to your November 1 letter regarding the Indian Brook Watershed Work Plan and Environmental Statement, Lancaster; based on current information, this Office finds no properties of historic, architectural, archeological, or cultural significance affected by the project.

Sincerely,

  
Mary M. Jeplum, Director  
NH Historic Preservation Office

MJ:jh

Copy: Margarett Monahan  
Lancaster Historical Society





OFFICE OF COMPREHENSIVE PLANNING  
STATE OF NEW HAMPSHIRE  
STATE HOUSE ANNEX, CONCORD 03301

November 18, 1974

Mr. Donald G. Burbank  
State Conservationist  
U.S. Department of Agriculture  
Soil Conservation Service  
Federal Building  
Durham, New Hampshire 03824

RE: Indian Brook Watershed  
Lancaster, New Hampshire

Dear Mr. Burbank:

We have reviewed the Draft Environmental Statement and Work Plan for the Indian Brook Watershed dated September, 1974, and transmitted by your letter of November 1, 1974.

The data is presented well and in sufficient detail, with the possible exception of further explanation of Site #2, as referenced on page 5 of the EIS report, and the lack of an accompanying detailed plan map.

Thank you for the opportunity to review these documents.

Sincerely,

A handwritten signature in cursive script that reads "Jerrold A. Moore".

Jerrold A. Moore  
Director of Regional Planning

JAM:jyb



The State of New Hampshire

COMMISSIONERS

HILL, Chairman  
A. BUCK  
WALD C. CALDERWOOD, P. E.  
BERNARD W. CORSON  
HERBERT A. FINCHER  
RICHARD M. FLYNN  
GEORGE T. HAMILTON  
ELMER L. JOHNSON  
GEORGE M. MCGEE, SR.  
JAMES E. MINNOCH  
MAYNARD H. MIRES, M. D., M. P. H.  
WAYNE L. PATENAUDE  
JAMES VAROTSIS



Water Supply and Pollution Control Commission  
Prescott Park  
P. O. Box 93-105 Loudon Road  
Concord 03301

APPENDIX C

STAFF

WILLIAM A. HEALY, P. E.  
Executive Director  
THOMAS A. LA CAVA, P. E.  
Deputy Executive Director  
and Chief Engineer  
LINDSAY M. COLLINS, P. E.  
Director of  
Municipal Services

November 21, 1974

Donald C. Burbank  
State Conservationist  
U.S. Dept. of Agriculture  
Soil Conservation Service  
Federal Building  
Durham, New Hampshire 03824

Dear Mr. Burbank:

Reference is made to your letter of November 1, 1974 relative to the draft environmental statement for the Indian Brook Watershed, New Hampshire as you requested, we offer the following comments:

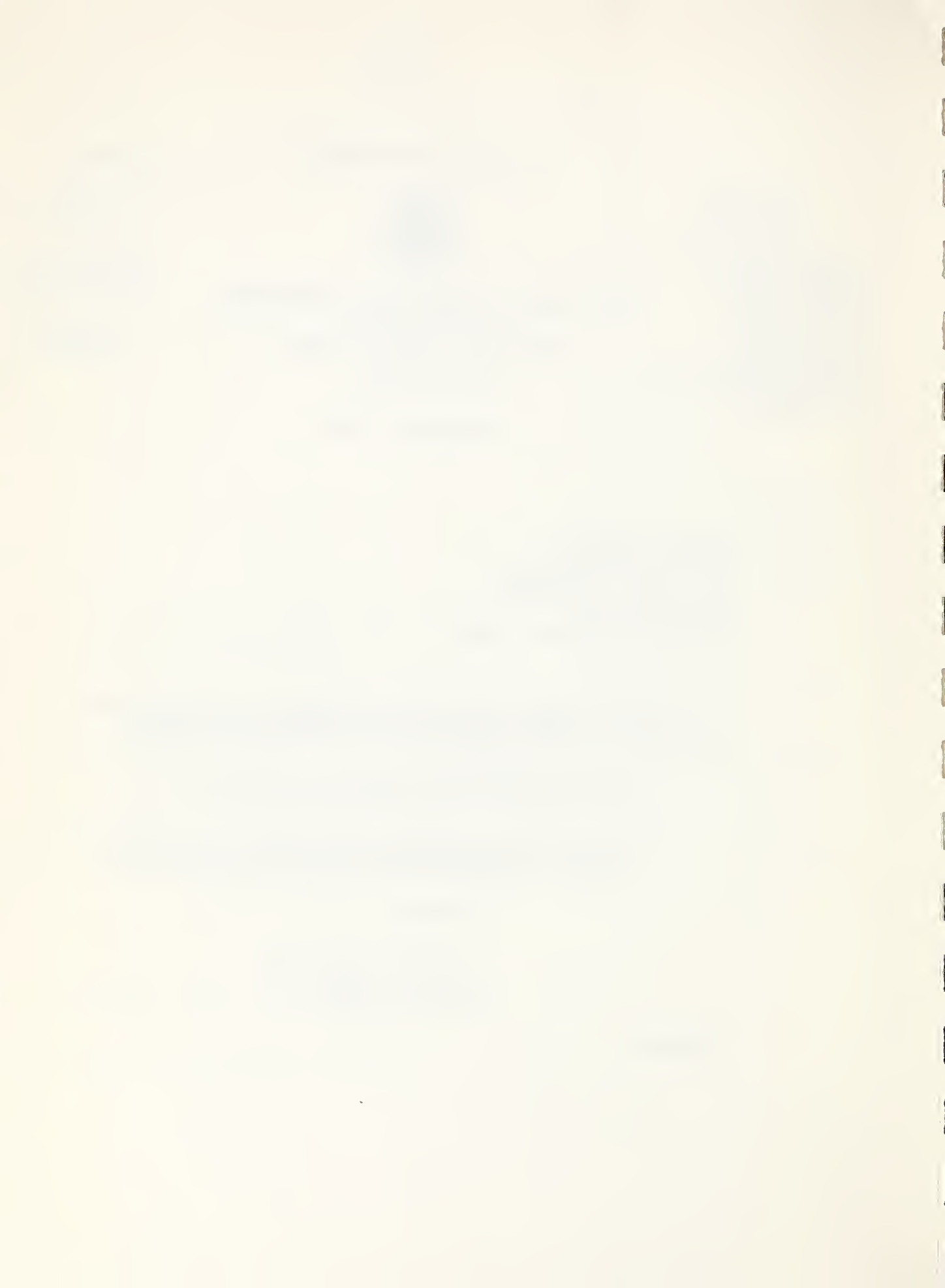
- 3
- (a) During construction there shall be no interference with water supplies or fish and other aquatic life
  - (b) There shall be no lowering of the Class B water quality during construction specifically, turbidity cannot exceed 10 units in trout water, or 25 units in non-trout water.

Sincerely,

A handwritten signature in cursive script, appearing to read 'W. A. Healy'.

William A. Healy, P.E.  
Executive Director

WAH:WRF/lw



# North Country Council, Inc.

APPENDIX C



Karl T. Bruckner, President  
Gerald I. Coogan, Executive Director

P.O. Box 269 Franconia  
New Hampshire 03580

Telephone 603/823-8108

January 9, 1975

Mr. Donald G. Burbank  
State Conservationist  
USDA - SCS  
Federal Building  
Durham, New Hampshire 03824

Re: Indian Brook Watershed, N. H.

Dear Mr. Burbank:

In accordance with Section 102 (2)(c) of the National Environmental Policy Act of 1969 and your request, the North Country Council has reviewed the draft Environmental Impact Statement for the Indian Brook Watershed located in Lancaster, New Hampshire. Our comments are as follows:

1. On page 15, the statement mentioned that seven acres of perpetual easements will be needed. It would be helpful to know exactly where the easements will be and impact to the local tax base.
2. On page 16, we understand that the Town of Lancaster will operate and maintain the channel work and this will be part of their annual operating budget.
3. The current population in Lancaster in 1974 was 3,500 according to the resident population published by the Office of Comprehensive Planning. On page 26, the text indicates the population of 3,300 by 1990 and 3,700 by 2020. This may have to be revised.
4. On page 47, it would be helpful to have a projection of the amount of additional people which may be brought to the area because of the improvement of the facility. This projection would help determine whether or not sanitary facilities will be needed (page 6).

Mr. Donald G. Burbank

-2-

The statement also refers to the possibility of 20 new acres of land being opened for potential development. The Planning Board should begin thinking about projected uses for that land. In addition, as you know, the NERBC is in the process of completing a supplemental study for the Connecticut River Basin. They are evaluating both structural and non-structural alternatives regarding flooding and it would be good if you had the value of their recommendations.

I hope these comments have been helpful for you.

Sincerely,



Gerald I. Coogan  
Executive Director

GIC/jjh





# SIERRA CLUB · New England Chapter

APPENDIX C

14 Beacon St., Rm. 719  
Boston, Mass. 02108  
28 December 1974.

Donald G. Burbank, State Conservationist  
Soil Conservation Service  
Durham, New Hampshire 03824

Dear Mr. Burbank:

The following comments on the Draft Environmental Statement for Indian Brook Watershed, Lancaster, Coos County, New Hampshire, are made on behalf of the Executive Committee of the Sierra Club, New England Chapter. We want these comments to be included in the official records for this project.

The land treatment aspects of the project seem to be worthwhile conservation measures for the watershed.

### General Comments and Questions:

The project's structural measures protect only 30 acres from a 100 year flood level. Of 30 residences protected, only 14 are houses, 16 are mobile homes, easily moved. To spend \$196,400. in structural measures for such a small benefit seems unreasonable.

It is stated (p. 15) that the land protected will probably be converted from agricultural use and forest to urban use - buildings. Thus reducing the area of flood prone land would increase urbanization in the floodplain. This is contrary to Federal law (Flood Disaster Act - 1973) which seeks to reduce damages due to building in the floodplain. Any flood event above the 100 year level would cause more damage to buildings in the floodplain than would occur at the present time. Dams and the channelization of 3000' of the Brook would in the long run tend to increase flood damage by encouraging building in the floodplain. How can the S.C.S. advocate such projects ?

It is stated (Appendix A) that fish and wildlife are not counted in the benefit:cost analysis because it is assumed that damages and benefits resulting from the structural aspects of the project would be equal. This assumption is not acceptable without full investigation. The point is also made that Indian Brook is not suitable for stocking by the State at the present time. Yet the report emphasizes projected recreational use for fishing (p.34), and fishing is used as a nominal benefit of the structural measures throughout the Draft Environmental Statement. If fishing other than trout fishing is meant, this should be explained fully.

In the Statement, it is noted that Lancaster is to participate

In Massachusetts:  
ESSEX COUNTY GROUP  
GREATER BOSTON GROUP  
THOREAU GROUP  
MT. HOLYOKE GROUP  
BERKSHIRE GROUP

VERMONT STATE GROUP  
CENTRAL VERMONT GROUP  
CHAMPLAIN VALLEY GROUP  
CONNECTICUT VALLEY GROUP  
OTTER VALLEY GROUP

NEW HAMPSHIRE STATE GROUP  
MONADNOCK GROUP  
UPPER VALLEY GROUP  
MAINE GROUP  
RHODE ISLAND GROUP

page 2 -

in the National Flood Insurance Program. If the town is to do this, it can not plan to develop in the floodplain and to increase future flood damages. The project would protect to the 100 year flood level, but greater floods will occur. The S.C.S. should assist not only in the land treatment phase of the planned project (p. 29) but in coordinating floodproofing of existing buildings, relocation of buildings and other floodplain management measures. Otherwise the efforts of H.U.D. and the S.C.S. are at odds with one another, and will result in a waste of tax payers' money and needless flood damages.

It is appropriate here to mention that two members of our Executive Committee are members of the Science Advisory Group to the New England River Basins Commission's Connecticut River Basin Program. Indian Brook, the subject of the projects under discussion, is a part of the Connecticut Basin. A study is in progress on the flood management of the Connecticut Basin with respect to various methods of reducing flood damages. The Science Advisory Group recently passed a resolution that the Indian Brook Project not be implemented until completion of the Supplemental Study on the Connecticut Basin, so that the conclusions reached may be applied to this portion of the Basin. We concur with this resolution in the interests of sound planning.

In this regard, it should be noted that the Draft Environmental Statement on Indian Brook reflects the philosophy that floods are bad and should be contained (by dams and by deepening brook channels). Recent trends in flood management are towards non-structural methods. The statement on p. 43, "The protection provided will encourage development", we consider to be the opposite result from the one that floodplain management requires.

Channelization is planned to lower the brook some 7 feet and to lower the water table as well. The effect of the concrete wall across the brook at the head of the channel is not fully examined in the Statement. Will the water table in fact be lowered? How is this known, and what would be the effect on springs and wells in the area? If the floodplain houses (14) are to be sewered in the future anyway, this will reduce the septic problem without the necessity of dams and the channel to lower floods.

Even with all structures completed, a very large flood (500 yr.) would still flood the town of Lancaster to over 2 feet - only with the projected development (after the structures), more damage would result to buildings than now.

Equating present and altered conditions at the dam sites as far as fish and wildlife are concerned is not adequate. And the reference on beaver-trout relationships is not pertinent, if, as said, the stream is unsuited to trout.

Alternatives

Flood Insurance - It appears that the Flood Insurance alternative has long term benefits not given sufficient weight. Flood prone areas would be protected from development of buildings. This would prevent future damages above the 100 year flood level.

This benefit was not discussed.

The adverse effects of lowering the water table were not discussed.

Flood Proofing - The cost is set at \$62,000. The 100 year flood only causes \$80,000 in damages. If the houses were floodproofed and the trailers moved, it would seem to be a less costly method than the proposed structures.

The fish and wildlife improvements are not validly cited because they did not enter into the benefit:cost analysis.

Relocation - The cost is said to be \$515,000. This would appear to be an inflated figure, but there are insufficient data to see how it was derived. Only 14 houses are involved, and they are said to be substandard housing. The 16 trailers could be easily moved. Flood prone land is not costly to acquire - only \$50. per acre the Statement said. (p. 26). Only 30 acres of land is the amount involved. Improved land is \$1,200 per quarter acre, (for relocation) The S.C.S. has been involved in land acquisition of floodplains in some parts of the country. This would seem to be an alternative worth investigating here.

Land use controls, flood proofing, and relocation - This cost is set at \$170,000. This is less than the \$196,400 for the proposed structures. Not reducing the level of flooding in the flood - plain is a benefit not a cost (see H.U.D. flood insurance and S.C.S. participation, p. 50).

Benefit : Cost Ratio:

The average annual cost of the project is \$11,600 (p. 55, Work Plan). The average annual damages are \$7,330 (p. 32 - DEIS).

How can these figures yield a positive benefit:cost ratio of 1.2 : 1 ?

Conclusions:

The Draft Environmental Statement does not make a convincing case for constructing the project (2 dams, 1 small concrete wall across the stream, and a channelization of 3000 feet).

Land treatment, plus floodproofing, relocation, and land acquisition are acceptable alternatives, considering all benefits and costs.

Sincerely yours,

*Robert Z. Norman*

Robert Z. Norman, Chapter Chairman.



# TOWN OF LANCASTER - *New Hampshire* 03584

*"The Friendly Town in the Friendly State"*

DONALD E. CRANE, *Town Manager*

February 20, 1975

Telephone 603 788-3391

APPENDIX D

Mr. Donald G. Burbank  
State Conservationist  
USDA, Soil Conservation Service  
Federal Building, Box G  
Durham, NH 03824

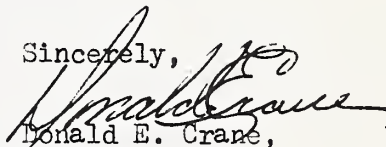
Dear Mr. Burbank:

This is in response to your question as to the Town of Lancaster requirement for all construction of new building to be connected to the public sewage disposal facilities in the Indian Brook Watershed.

The Town of Lancaster requires that all new construction be connected to the public sewage disposal facilities where available.

Any construction of new buildings in the Indian Brook Watershed downstream of the planned drop structure on Indian Brook will require connection to the public facilities.

Sincerely,



Donald E. Crane,  
Town Manager

DEC/dad



Science Advisory Group Resolution Relative to the  
Indian Brook Project and Other Projects With Similar Status

The Science Advisory Group of the Connecticut River Basin program was asked to review the preliminary draft environmental impact statement prepared by the Soil Conservation Service for their proposed PL-566 project on Indian Brook near Lancaster, N.H. The project includes a 35-foot high dam with a permanent pool of 120 acres plus about 2,900 feet of channel improvement work. The following is the Science Advisory Group's response.

The Science Advisory Group notes that this project was approved "subject to satisfactory completion of environmental impact evaluation" in the NERBC 1980 Basin Plan (p. S-5). The Group further notes that "satisfactory completion" requires that "1) the capability has been developed and used to form a reasonable assessment of regional environmental consequences; 2) environmental consequences have been assessed by the Commission in the case of projects having regional impacts; and 3) it is shown that environmental consequences will be acceptable" (NERBC 1980 Basin Plan, p. 74).

The Environmental Subcommittee of the Science Advisory Group finds that the preliminary draft environmental impact statement for this project does not represent satisfactory completion of the above requirements. The statement does not reflect the capability to provide an acceptable assessment of environmental impacts of flood-management plans that is being developed in the Supplemental Study in response to objectives stated in the NERBC 1980 Basin Plan (p. 73-74):

"The study includes an evaluation of flood management alternatives, but a broader purpose is to furnish information that will be useful in evaluating the environmental impact of all structural projects...This study will provide an additional environmental screening for structural elements of the 1980 Basin plan taken as a whole, and is also expected to provide a foundation for environmental evaluations at the project authorization level." (Emphasis added.)

The Science Advisory Group notes that, while the Indian Brook project was not selected for detailed study within the Supplemental Study, it was included on the list from which the Study Management Team, with the advice of the advisory groups, made the selection of the third study watershed.

Therefore the Science Advisory Group members listed below recommend that the New England River Basins Commission:

- 1) withhold approval of the Indian Brook project;
- 2) withhold approval of all such flood management projects until the Supplemental Study is completed or until environmental impact statements utilizing the information and techniques generated in the Supplemental Study are submitted.

APPENDIX E

Approved:

Paul Bock  
Professor of Engineering  
University of Connecticut

Richard Bower  
Professor of Economics  
Dartmouth College

John Brainerd  
Professor of Biology  
Springfield College

Gordon Byers  
Chairman, Water Resources Res. Ctr.  
University of New Hampshire

Jane Dingman  
Science Consultant - Massachusetts  
Public Interest Research Group

Eugene Engel  
Chairman, Dept. of Resource Econ.  
University of Massachusetts

Paul Godfrey  
Asst. Professor of Botany  
University of Massachusetts

Frank Kaminsky  
Associate Professor of Industrial Engr  
University of Massachusetts

Robert Norman  
Professor of Mathematics  
Dartmouth College

Rutherford H. Platt  
Assist. Professor of Geography  
University of Massachusetts

Donald Progulske  
Head Dept. of Forestry & Wildlife  
University of Massachusetts

Andrew Scheffey  
Professor of Landscape Architecture  
University of Massachusetts

Thomas Sharpless  
Asst. Professor of Chemistry  
University of Hartford

David Stickel  
Asst. Professor of Zoology  
Holyoke Community College

October 22, 1974





